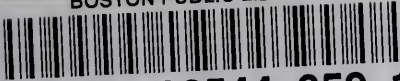


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The Commonwealth of Massachusetts

ANNUAL REPORT

OF THE

METROPOLITAN DISTRICT COMMISSION

FOR THE YEAR 1929



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REPORT OF THE METROPOLITAN DISTRICT COMMISSION

To the Honorable the Senate and House of Representatives of the Commonwealth of Massachusetts in General Court assembled.

The Metropolitan District Commissioner has already presented to your Honorable Body an abstract of the account of the receipts, expenditures, disbursements and liabilities of the Metropolitan District Commission for the fiscal year ending on November 30, 1929, and now, in accordance with the provisions of section 100 of chapter 92 of the General Laws, presents a detailed statement of its doings for the calendar year ending on December 31, 1929.

TENTH ANNUAL REPORT

I. ORGANIZATION AND ADMINISTRATION

COMMISSION, OFFICERS AND EMPLOYEES

The term of office of Davis B. Keniston expired on November 30, 1929, and he was reappointed for the term of five years next succeeding. The membership of the Commission has consequently remained as in the preceding year: Davis B. Keniston, Commissioner, Frank A. Bayrd, George B. Wason, William F. Rogers and Charles H. J. Kimball, Associate Commissioners.

Edwin H. Rogers has continued as Director and Chief Engineer of Park Engineering, William E. Foss as Director and Chief Engineer of the Water Division and Frederick D. Smith as Director and Chief Engineer of the Sewerage Division. George Lyman Rogers, who had ably and efficiently served the Metropolitan Park Commission as its Secretary from August 25, 1896, until the consolidation in 1919 and as secretary to the Commission since that time, died April 11, 1929. William E. Whittaker, the Assistant Secretary, was appointed to this position.

The maximum number of employees during the year was 1,625, divided as follows: general offices, 35; parks, 957; water, 399; sewerage, 234.

In this tabulation of employees the police are included under parks, although they give considerable protection to portions of the water system.

II. GENERAL FINANCIAL STATEMENT

Year ending November 30, 1929

Expended for construction	\$1,228,450.16
Expenditures, miscellaneous	135,061.18
Expenditures for maintenance	3,715,651.13
Total expenditures	5,079,162.47
Unexpended balance, maintenance appropriations	866,083.06
Serial bonds and notes issued	750,000.00*
Serial bonds and notes paid	1,909,187.50
Increase in sinking funds	2,402,156.20
Decrease in net debt	3,561,343.70

On November 30, 1929

Net debt	\$32,545,169.36
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III. CONSTRUCTION

No work upon the Malden, Revere and Everett drainage channel has been carried on during the year as the temporary injunction issued by the Supreme Court has not yet been dissolved.

The extension of the New Mystic Valley main sewer from its present terminus near Grove Street in Medford to Prescott Street in Medford was completed and the sewer put into operation September 20, 1929

* Including renewals.

Surveys and studies, including borings, have been made over a large part of the route of the New Neponset Valley sewer and contracts executed for the construction of three sections of the sewer totalling 11,798 feet in length, of which 2,535 feet had been completed at the end of the year.

Fifty new water valves from 12 to 30 inches in diameter have been installed in the water distribution system during the year.

The northern high-service pipe line from Main Street, Malden, to Broadway, Revere, 19,103 feet in length, the laying of which was started in 1928, was completed during the year.

The lower section of the new Weston Aqueduct supply main from Charles River at Commonwealth Avenue, Newton, to Magazine Beach at Memorial Drive, Cambridge, was started by the construction during the year of the lower section from Magazine Street, Cambridge, to a point 300 feet west of North Harvard Street on Western Avenue, Brighton, a distance of about 6,700 feet.

The river wall just below the River Street Bridge, Boston, was completed and the construction and surfacing of Soldier's Field Road from Chilmark Street to Western Avenue was completed and opened to traffic. The sidewalks and planting areas will be completed early in the coming year.

Carlton Street extension from Commonwealth Avenue, Boston, to Mountfort Street, Brookline, was constructed and turned over to the town of Brookline for maintenance as a town roadway.

A small section of sea wall was constructed at King's Beach, Swampscott.

Neponset River Parkway (formerly Regent Street) from Milton Street to north of Waterloo Street, Hyde Park, was constructed.

Some filling has been placed beside Mt. Auburn Street, Cambridge, in preparation for the extension of Memorial Drive along the Charles River to connect with Fresh Pond Parkway.

The following construction work was started, but had not been completed at the end of the year:—

Lynn Fells Parkway, Bellevue Avenue, Melrose, to Newburyport Turnpike, Saugus.

West Roxbury Parkway, Newton Street to Hammond Street, Brookline.

Relocation, grading and surfacing of Hillside Street easterly from Blue Hill River Road to the recreation grounds at Houghton's Pond.

Change in alignment of Administration Road, easterly from Sassamon Road, Blue Hills Reservation, Quincy.

Furnace Brook Parkway between Quarry Street and Cross Street, Quincy, has been resurfaced and Revere Beach Parkway from Main Street to Second Street, Everett, has been widened and resurfaced.

New electric lighting has been installed on Soldiers Field from Chilmark Street to Western Avenue and from North Harvard Street to Western Avenue; on Mystic Valley Parkway West from Medford Street, Medford, to Mystic Street, Arlington; on Neponset River Parkway from Waterloo Street to West Milton Street, Boston; and on Furnace Brook Parkway from Adams Street to Newport Avenue, Quincy.

IV. PARKS AND RESERVATIONS

The usual work of maintenance and upkeep of parks, reservations and boulevards has been continued during the year.

The old sanitary at the corner of Revere Street and Revere Beach Reservation has been torn down and removed as its use was no longer needed after the completion of the sanitary under the shelter on the beach side of the reservation.

A long section of rock shore protection was placed along the Lower Mystic Lake adjacent to Mystic Valley Parkway West.

Quannapowitt Parkway was reshaped, rolled and treated and opened to travel.

The bank of the Charles River between the Massachusetts Institute of Technology boat house and the Boston & Albany Railroad was subgraded and cleaned of brush and between the location of the old temporary bridge

and the boat house was graded, loamed and seeded. The river bank between Western Avenue and a point above Anderson Bridge was resloped and graded and the shore riprapped. The areas both sides of Memorial Drive west of Cottage Farm Bridge have been graded and partially loamed preparatory to seeding and planting.

The south slope of Bunker Hill Monument grounds has been resloped and graded and the lodge house repainted and redecorated.

About 18 acres of marsh land along Nonantum Road in Boston and Newton was cleared of weeds, cultivated, graded and seeded.

The junction of Brooks Street and North Beacon Street, Brighton, has been widened.

A cement wall 173 feet in length has been constructed along the river bank west of the police station at Riverside.

Shrubs and vines have been set out at the approaches to the Wales Street Bridge over the Charles River between Newton and Wellesley.

Early in the year the Town of Weston transferred to the Commonwealth its park land lying west of Park Road and during the year on this property and other land of the Riverside Recreation grounds a nine-hole golf course has been built which will be ready for public use in the spring of the coming year.

Considerable improvement has been made in the recreation grounds at Houghton's Pond by the building of a stone wall 622 feet in length, the sloping of about 1,000 feet of the banks of the pond and building of a shore walk, two concrete flights of steps and a wooden foot bridge.

Two fire watch towers have been erected, one a 35-foot steel tower on Chickatawbut Hill and the other a 20-foot wooden tower on Tucker Hill.

The parking yard at Nantasket Beach has been much improved by setting of posts between the area and the street with one entrance and exit and dividing the area into two lanes. Lighting for the yard was installed.

Late in the afternoon of November 28 Nantasket Beach was seriously threatened by a fire which started in the building on the steamboat landing and destroyed five boats and most of the wharf. A strong wind carried sparks to the reservation bath house and all but a portion of the women's yard was burned. In spite of the force of the gale there was no further damage to the reservation property. Plans are under way for a new bath house to be completed in time for the bathing season.

The permanent police force, except for temporary vacancies, has remained the same during the year. The force at the end of the year consisted of one Captain and Executive Officer, 5 captains, 5 lieutenants, 1 lieutenant inspector, 1 detective sergeant, 16 sergeants, 150 patrolmen, 1 policewoman and 1 call officer, a total of 181.

Spencer G. Hawkins, Captain and Executive Officer and Superintendent of the Revere Beach Division for 5 years, died during the year. He had given 33 years of loyal service to the Metropolitan Police Force. Captain Edward M. Woods of the Middlesex Fells Division was appointed Executive Officer to fill this vacancy and Lieut. John J. Murphy was appointed Captain and Superintendent of the Revere Beach Division. Further changes in the Department during the year are as follows: 1 sergeant and 1 officer have been retired on pensions; 2 officers have died; 2 officers have resigned and 1 has been discharged; 2 sergeants have been promoted to lieutenants; 2 officers promoted to sergeants and 7 new officers appointed to fill vacancies. Thirty-one patrolmen and one policewoman were added to the department as a temporary force during the summer season.

During the year 5,997 complaints and arrests were made, an increase of 1,011 over the preceding year, resulting in 5,597 convictions. On July 3, 1929, eight liquor raids were made in the city of Revere, as a result of which thirty-one complaints for violation of the liquor laws were made in Chelsea Court and from which convictions in all but one case were obtained. The investigations and raids were undertaken at the request of the Mayor of Revere. During the year thirteen members of the force were commended for meritorious service.

One hundred and twenty-two band concerts were given during the summer

months in the various parks and reservations at a cost of \$19,881.60. A series of thirty symphony concerts were given on the Esplanade under the direction of Arthur Fiedler, beginning July 4th for five weeks. These concerts were supported by public subscription without cost to the District except that involved in the construction of a stage and shell for the players and the policing and maintenance of the grounds. These concerts drew audiences of from five to ten thousand people, who deeply appreciated the musical programs. These concerts proved to be one of the pleasantest of the public attractions ever given upon the Metropolitan Reservations.

V. RAINFALL AND CONSUMPTION OF WATER

The total yield of the watersheds for the year was some over five inches below normal. It was considerably above normal for the first five months and much below normal for the remainder of the year. Wachusett Reservoir filled early in the spring and about ten billion gallons of water was wasted. Beginning with the first of June the water was drawn down steadily until the close of the year, at which time the elevation of the water was 19 feet below high water, a reduction of 25 billion gallons of storage. This is the heaviest draft upon the storage of the reservoir in any one year since it first filled and emphasizes the need of the new supply.

During the year 50,021,177,000 gallons of water were furnished to the 18 cities and towns supplied, equivalent to a daily average consumption of 137,044,300 gallons, an increase of a little over 1,000,000 gallons; and for the estimated population of 1,381,520 at the rate of 99.2 gallons per capita, a decrease of 0.4 gallon per capita.

VI. SPECIAL INVESTIGATIONS

In accordance with the provisions of Chapter 7 of the Resolves of 1929 the Commission investigated and reported on the advisability of developing a section of the west side of the Mystic River in the city of Somerville for park and beach purposes.

In accordance with the provisions of Chapter 25 of the Resolves of 1929 the Metropolitan District Commission and the Department of Public Works investigated and reported on the widening or reconstruction of the Saugus River Bridge between the Point of Pines in the city of Revere and the city of Lynn.

In accordance with the provisions of Chapter 32 of the Resolves of 1929 the Commission investigated and reported relative to certain areas in the city of Medford taken over by the Commonwealth, with a view to their improvement and development as a part of the Mystic River Reservation.

VII. OTHER REPORTS

The reports of the Directors of Park Engineering, Water and Sewerage, with tables, statistics and financial statements, are hereby appended.

Respectfully submitted,

DAVIS B. KENISTON,
Metropolitan District Commissioner.

February 28, 1930.

REPORT OF THE DIRECTOR AND CHIEF ENGINEER OF PARK ENGINEERING

HON. DAVIS B. KENISTON, *Commissioner, Metropolitan District Commission.*

DEAR SIR: The following report is submitted of the work done under the direction and supervision of the engineering department of the parks division during the year ending December 31, 1929.

ORGANIZATION

The engineering force has been gradually increased during the year and has averaged as follows: one director of park engineering, one associate civil

Metropolitan Park System—December 1, 1929.

[illegible]

* Includes Pilgrim Boulevard from Furnace Brook Parkway to Sea Street.

engineer, one senior civil engineer, one superintendent of locks and drawbridges, one supervisor of machinery and equipment, five assistant civil engineers, ten junior civil engineers, one inspector of construction, eight senior engineering aids, fifteen junior engineering aids, one foreman of garage and chauffeur, three stenographers, one plan clerk and forty-eight lock and drawbridge assistants, mechanics, operators and helpers.

All construction work and the general direction and supervision of all maintenance and repairs of parkways and boulevards, bridges, buildings and structures in the various park divisions and the operation of the various drawbridges and locks is in charge of the engineering department.

CONSTRUCTION AND MAINTENANCE WORK

During the year plans and specifications have been prepared and construction supervised on the following work for which contracts were let by the commission amounting to about \$433,000.00:

Reconstruction of sea wall, Kings Beach Reservation, Swampscott.

Construction of Soldiers Field Road, Western Avenue to Chilmark Street, Boston, Brighton District.

Construction of Carlton Street Extension, Commonwealth Avenue to Mountfort Street, Brookline.

Resurfacing Furnace Brook Parkway between Quarry Street and Cross Street, Quincy.

Constructing Neponset River Parkway (formerly Regent Street) from Milton Street to north of Waterloo Street, Boston, Hyde Park District.

Widening and resurfacing Revere Beach Parkway, Main Street to Second Street, Everett.

Construction of Lynn Fells Parkway, Bellevue Avenue, Melrose to Newburyport Turnpike, Saugus.

Grading and loaming slopes, and building gravel walk on the southerly slope of Bunker Hill Monument Reservation, Charlestown.

Construction of West Roxbury Parkway, Newton Street to Hammond Street, Brookline.

Relocating, grading and surfacing Hillside Street, easterly from Blue Hill River Road, Blue Hills Reservation, Milton.

Change in alignment of Administration Road, easterly from Sassamon Road, Blue Hills Reservation, Quincy.

Of the contracts let during 1928 on which work had been in progress during the year, one was not completed until the summer of 1929, as follows:

Construction of river wall along Soldiers Field Road, southerly from Cambridge Street, Boston, Brighton District.

The following work has been done either by contract or by the maintenance forces of the various divisions of the park department:

Reconstruction and resurfacing of part of Blue Hill River Road in Milton;

Building concrete wall, fencing, edgestone and grading at Sachem Brook, Quincy Shore Reservation;

Widening of Brooks Street at North Beacon street, Brighton;

Building concrete coping at Fenno Street, Quincy;

Completion of roadway of Quannapowitt Parkway;

Constructing granolithic walks in Middlesex Fells Parkway;

Filling beside Mt. Auburn Street, Cambridge, as a part of the improvement of the Charles River Basin, authorized by Chapter 371 of the acts of 1929;

Filling and subgrading land in Dedham near the Spring Street Bridge over the Charles River.

Grading, loaming and riprap shore protection along Memorial Drive in Cambridge;

Grading and loaming the land of the commonwealth along Memorial Drive, Cambridge, between the Cottage Farm Bridge and Magazine Beach;

Regrading the recreation grounds and slopes on the northerly side of Houghton's Pond, Milton;

Building a steel fire lookout and observatory tower on the summit of Chickatawbut Hill, Quincy;

Laying out and grading nine-hole golf course in the town of Weston adjacent to the Riverside recreation grounds.

PLANS, STUDIES AND ESTIMATES

Plans, studies and estimates have been made for proposed or authorized work as follows: the widening of East Milton Street in the Hyde Park district of Boston as part of the Circumferential Highway; the widening and relocation of Main and Forest Streets, Medford and Stoneham; the development of the Charles River Basin, authorized by Chapter 371 of the acts of the legislature of 1929, and for which Mrs. James J. Storrow contributed one million dollars towards the cost thereof; and the relocation and acquirement of additional land for Hammond Pond Parkway, Brookline and Newton.

Surveys and plans have been made as follows:

For conveyance of portions of land of the commonwealth to the Dewey and Almy Chemical Company in Cambridge and to W. Stanley Tripp between Cottage Farm Bridge and Chilmark Street, Boston;

For transfer to the city of Boston, Transit department, of land in Boston, Dorchester District, at Crest Avenue and at Eliot Street, Milton;

For conveyance in Milton on Administration Road to the Commonwealth;

For additional taking on Soldiers Field Road, Western Avenue to Cambridge Street, Boston, Brighton District;

For care and control of park lands in the town of Weston transferred to the Metropolitan District Commission on Park Avenue from Intervale Road to the Boston & Albany Railroad;

Additional taking south of Chesterfield Street, Boston, Hyde Park District;

Taking at the junction of Waterloo Street, Boston, Hyde Park District;

Taking for change in alignment of Administration Road, easterly from Randolph Avenue, Blue Hills Reservation, Quincy;

Taking for Pilgrim Boulevard at the corners of Pilgrim Boulevard and Sea Street, Quincy;

Taking westerly from Railroad Street, Revere;

Conveyance of Brookline town land to the commonwealth for the extension of West Roxbury Parkway along Newton Street to Hammond Street in Brookline.

LIGHTING OF PARKWAYS AND BOULEVARDS

New parkway lighting installations have been completed and contracts for the operation thereof have been made as follows:

Soldiers Field Road, Chilmark Street to Western Avenue, Boston;

Soldiers Field Road, North Harvard Street to Western Avenue, Boston;

Mystic Valley Parkway, Arlington Extension, from Mystic Street to Medford Street, Arlington;

Neponset River Parkway, formerly Regent Street, Waterloo Street to West Milton Street, Boston;

Furnace Brook Parkway, Adams Street to Newport Avenue, Quincy.

PERMITS

Four hundred permits were issued for driveway entrances and miscellaneous purposes and one hundred and fifty orders concerning restrictions were issued and reported upon. This division has furnished the supervision of all work with regard to permits and has reported on building operations where violations of restrictions might be involved.

ICE BREAKING IN BASIN

The work of breaking ice in the channels of the Charles River Basin below Longfellow Bridge and in Broad and Lechmere Canals for the season of 1928 and 1929 was done by contract. The contract cost was \$6,200.00.

FINANCIAL

The cost of engineering salaries and expenses was as follows:

Construction:			
Salaries	.	.	\$41,380.84
Expenses	.	.	3,221.73
Maintenance:			
Salaries	.	.	\$58,441.57
Expenses	.	.	4,013.13
			62,454.70
Total	.	.	\$107,057.27

Respectfully submitted,
EDWIN H. ROGERS,
Director of Park Engineering.

TABLE I — The following is a record of the traffic through locks and drawbridges during the year:

<i>Charles River Dam, Lock, and Drawbridges</i>			
Number of openings of lock	.	.	3,394
Number of vessels	.	.	4,286
Number of boats	.	.	1,922
Lumber (feet B. M.)	.	.	1,712,000
Coal (tons)	.	.	295,213
Oil (bbls.)	.	.	530,850
Empty barrels	.	.	28,300
Piling (pieces)	.	.	650
Sand (cubic yards)	.	.	287,880
Gravel (tons)	.	.	109,272
Rubble (tons)	.	.	200
Granite (tons)	.	.	2,997
Miscellaneous (tons)	.	.	4,050

There were 2,341 highway drawbridge openings.

<i>Cradock Bridge Lock</i>			
Number of openings	.	.	178
Number of boats	.	.	215
Number of boats over rollway	.	.	99

<i>Neponset Bridge</i>			
Number of openings	.	.	315
Number of vessels	.	.	514
Coal (tons)	.	.	40,714
Lumber (feet B. M.)	.	.	2,578,000
Steel (tons)	.	.	180

<i>Dorchester Bay Bridge</i>			
Number of openings	.	.	524
Number of vessels	.	.	824
Oil (bbls.)	.	.	227,200

<i>Malden River Bridge</i>			
Number of openings	.	.	344
Number of vessels	.	.	557

<i>Saugus River Bridge</i>			
Number of openings	.	.	390
Number of vessels	.	.	655

Parkways:	Double Roadways Miles	Single Roadways Miles	
Alewife Brook	—	.70	
Blue Hills	1.46	1.61	
Memorial Drive ¹	.37	3.19	
Dedham	—	.89	
Fresh Pond	—	.50	
Furnace Brook	—	4.32	
Lynn Fells	—	1.05	
Lynnway	—	.68	
Middlesex Fells	4.10	1.77	
Mystic Valley	—	6.17	
Nahant Beach	—	.50	
Neponset River	—	1.05	
Old Colony	—	3.22	
Quannapowitt	—	.68	
Revere Beach	1.45	3.73	
West Roxbury	—	2.85	
Winthrop	—	1.09	
Woburn	—	1.38	
	7.38*	35.38	35.38

Highways transferred by or taken from cities and towns:

Alewife Brook Parkway	.44	
Blue Hills Reservation	1.23	
Charles River Reservation	.39	
Middlesex Fells Reservation	6.63	
Nantasket Beach Reservation	.71	
		9.40

Lengths of automobile roads in reservations:

Blue Hills	5.35	
Charles River	2.80	
Middlesex Fells	4.06	
		12.21

Grand Total	93.42
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All above roads open to automobile traffic.

Lenghts of Carriage Roads and Bridle Paths in Reservations

	Miles
Blue Hills Reservation	27.08
Middlesex Fells Reservation	14.55
Stony Brook Reservation	1.60
Beaver Brook Reservation	.22
Charles River Reservation	.89
Total	44.34

Electric Street Lights in Parkways and Reservations

	Lights
Alewife Brook Parkway (10-1500 c.p., 16-600 c.p.)	26
Blue Hills Parkway (600 c.p.)	59
Blue Hills Reservation, Hillside Street (80 c.p.)	12
Charles River Dam (1500 c.p.)	16
Charles River Reservation, Embankment Road, (104-100 c.p., 2-80 c.p.)	106
Charles River Reservation, North Beacon Street (4-1500 c.p., 9-1000 c.p.)	13

* Equivalent in miles of single roadway 14.76
¹ Area included in Charles River Reservation.

	Lights
Charles River Reservation, Soldiers Field Road (1500 c.p.)	17
Dorchester Bay Bridge (1500 c.p.)	8
Fresh Pond Parkway (80 c.p.)	15
Furnace Brook Parkway (600 c.p.)	52 ¹
Harvard Bridge (24-600 c.p., 6-60 c.p.)	30
Lynn Fells Parkway (600 c.p.)	17
Lynn Shore Reservation (6-1500 c.p., 24-1000 c.p.)	30
Lynnway (600 c.p.)	11
Memorial Drive (16-600 c.p., 173-250 c.p.)	189
Middlesex Fells Parkway (9-1500 c.p., 206-600 c.p.)	215 ²
Middlesex Fells Reservation (27-600 c.p., 53-250 c.p.)	80
Mystic Valley Parkway (600 c.p.)	48
Nahant Beach Parkway (1500 c.p.)	12 ³
Nantasket Beach Reservation (40-100 c.p., 12-600 c.p.)	52 ⁴
Neponset Bridge (600 c.p.)	16
Old Colony Parkway (49-1500 c.p., 2-1000 c.p.)	51
Quincy Shore Reservation (600 c.p.)	43 ⁵
Revere Beach Parkway (600 c.p.)	181 ⁶
Revere Beach Reservation (108-1500 c.p., 1-500 c.p., 3-200 c.p., 6-100 c.p., 1-40 c.p.)	119 ⁷
Saugus River Bridge (100 c.p.)	7
Weeks Bridge (60 c.p.)	24
West Roxbury Parkway (600 c.p.)	27 ⁸
Winthrop Parkway (5-600 c.p., 14-250 c.p.)	19
Winthrop Shore Reservation (600 c.p.)	7
Woburn Parkway (600 c.p.)	4
Total	1,506

	Miles of Seashore	Miles
Lynn Shore		1.50
Nahant Beach		3.92
Revere Beach		2.74
Winthrop Shore		1.71
Nantasket Beach		1.02
Quincy Shore		2.19
Total		13.08

	Lengths of Sea Walls	Miles
Lynn Shore		1.30
Revere Beach at Northern Circle		.08
Revere Beach at Eliot Circle		.15
Revere Beach, shore protection, bath house shelter to Revere Street shelter		.29
Winthrop Shore, bridge to Great Head		1.04
Revere Beach, shore protection, south of Northern Circle		.28
Winthrop Shore, bridge to Grover's Cliff		.23
Quincy Shore Reservation, shore protection south of Webster Street		1.08
Quincy Shore Reservation, southerly end		.15
Nantasket Beach Reservation		.54
Winthrop Parkway, Revere and Winthrop, Broad Sound Avenue, to Sewall Avenue		.52
Total		5.66

¹ Twenty-three all night, all year. Twenty-five all night, except November 1 to March 31, until 1 A.M. Four, April 1 to October 31.
² Fifty-eight of these all night, March 15 to November 15.
³ Five, June 1 to December 1.
⁴ Twenty-three in summer only.
⁵ Seven all night, April 1 to October 31. Thirty-six all night, except November 1 to March 31, to 1 A.M.
⁶ Seventy-nine all night, April 1 to October 31.
⁷ Thirty all night, May 1 to October 31. Thirty-three to midnight, June 1 to September 30. Two all night, May 1 to September 30.
⁸ All night, except November 1 to March 31 until 1 A. M.

	<i>Miles of River Bank</i>	<i>Miles</i>
Charles River		33.56
Mystic River		8.16
Neponset River		15.86
Alewife Brook		4.50
Total		62.08

	<i>Bridges</i>	
Reinforced concrete bridges		18
Steel bridges		12
Wooden bridges		7 ¹
Drawbridges		6
Footbridges		12
Total		55

	<i>Culverts</i>	
Reinforced concrete and other masonry culverts		44

	<i>Dams</i>	
Beaver Brook Reservation, small wooden dams		2
Blue Hills Reservation, small wooden dam		1
Charles River Reservation, wooden dam at Watertown, 220 feet in length		1
Charles River Reservation, Charles River Basin, tidal dam, 1,200 feet in length		1
Charles River Reservation, small stone dam in branch below Washington Street, Newton Lower Falls		1
Charles River Reservation, reinforced concrete dam at Washington Street, Newton Lower Falls, 175 feet in length		1
Furnace Brook Parkway, reinforced concrete dam, upstream from Black's Creek Bridge		1
Hemlock Gorge Reservation, small stone masonry dam with stop planks, in gorge		1
Hemlock Gorge Reservation, small reinforced concrete dam on east branch of river, Newton Upper Falls		1
Hemlock Gorge Reservation, reinforced concrete dam in Charles River at Boylston Street, Newton Upper Falls, 90 feet in length		1
Mystic River Reservation, reinforced concrete tidal dam at Cradock Bridge, 100 feet in length; weirs 400 feet in length		1
Total		12

	<i>Lock Gates, Sluice Gates and Tide Gates</i>	
Charles River Reservation, Charles River Basin Tidal Dam, 6 lock gates, 13 sluice gates, 43 tide gates.		
Mystic River Reservation, Cradock Bridge Tidal Dam, 2 lock gates, 4 sluice gates, 8 tide gates.		
Quincy Shore Reservation, 8 tide gates.		
Revere Beach Parkway, 1 tide gate.		

	<i>Police Signal System</i>	<i>Miles</i>
Blue Hills Division		31½
Middlesex Fells Division		18¼
Nantasket Beach Division		2½
Charles River Reservation		10
Fresh Pond Parkway		½
Total		62¾

¹ One-half of Wellington bridge rebuilt with concrete girders.

Revere Beach Division police signal system, serving 11 miles of parkways and reservations, and Middlesex Fells Division, serving 1½ miles of parkway, on wires leased from the New England Telephone and Telegraph Company.

REPORT OF THE DIRECTOR AND CHIEF ENGINEER OF WATER DIVISION

DAVIS B. KENISTON, *Commissioner, Metropolitan District Commission.*

SIR:—I respectfully submit the following report of the construction and maintenance operations of the Water Division for the calendar year 1929.

ORGANIZATION

At the beginning of the year there were 50 permanent employees in the main and branch offices, and 290 permanent and temporary employees engaged in maintaining and operating the reservoirs, aqueducts, pipe lines, hydroelectric and pumping stations and in doing miscellaneous construction work. The force at the main office was increased by one permanent employee and one vacancy was filled in a branch office. The maintenance and operating force was increased by the filling of four vacancies and by the making permanent of two temporary waste water inspectors. Including the temporary force employed during the summer, the maximum number of employees of all classes at any time during the year was 397. There are now 52 permanent employees in the main and branch offices and 293 permanent and temporary employees engaged in the maintenance and operation of the works.

METROPOLITAN WATER DISTRICT AND WORKS

The Water District now includes 20 municipalities with an area of about 174 square miles and population as of July 1, 1929, of 1,486,370. The Water Works lands include an area of about 19,000 acres, of which about 2,000 acres have been planted with pine trees.

The works include 9 storage reservoirs with 200 square miles of tributary watershed, a total storage capacity of 80 billion gallons and water surface of 8,600 acres; 60 miles of aqueducts; 2 hydroelectric power stations of a capacity of 7,000 horse-power; 16 miles of high-tension power transmission line; 5 distribution pumping stations with a combined equipment of 6,100 horse-power and pumping capacity of 282 million gallons a day; 12 distribution reservoirs with a capacity of 2.5 billion gallons, and 154.07 miles of distribution mains. The consumption of water from the Metropolitan Water Works during the year by the 18 municipalities regularly supplied was 50,021,177,000 gallons, equivalent to an average daily consumption of 137,044,300 gallons or 99.2 gallons per capita for a population of 1,381,520 in the district supplied.

CONSTRUCTION

PURCHASE OF WATER VALVES

The Chapman Valve Manufacturing Company of Indian Orchard completed the delivery of the 32 screw lift water valves from 12 inches to 30 inches in diameter under the contract made in April, 1928. The total value of the work done under the contract in 1928 and 1929 is \$14,863.59.

Under Contract No. 68 the Michigan Valve and Foundry Company of Detroit furnished 28 screw lift water valves for pipe lines, including 16 valves 16 inches in diameter and 12 valves 36 inches in diameter. The total value of the work done under this contract is \$22,772.

NORTHERN HIGH SERVICE PIPE LINES

The C. & R. Construction Company of Boston completed the furnishing and laying of welded steel pipes 30 inches in diameter for the northern high

service pipe line from Main Street, Malden, to Broadway, Revere. The contract for this work was made July 5, 1928. The total length of the pipe line, including pipes laid in 1928 and 1929, is 19,103 feet, and the total cost of the contract work is \$205,926.15. Including all additional work the total cost amounts to \$277,544.61.

WESTON AQUEDUCT SUPPLY MAINS

The construction of the lower section of the new Weston Aqueduct supply mains, for which surveys were made in 1928, was begun under Contract No. 69, made with A. G. Tomasello and Son, Inc., May 1, 1929.

The new main will extend from the Charles River at Commonwealth Avenue in Newton to Magazine Street at Memorial Drive in Cambridge, a distance of about 8.5 miles.

The section constructed under Contract No. 69 extends from a point in Western Avenue 300 feet west of North Harvard Street in Brighton to Magazine Street in Cambridge, and includes 4,665 feet of pipe line 60 inches in diameter, 2,087 feet 48 inches in diameter and 1,081 feet 42 inches in diameter. All of the pipes are made of steel plates $\frac{1}{2}$ of an inch in thickness with electric welded shop joints and riveted field joints.

These new pipe lines were connected with four lines of steel pipes 30 inches in diameter which were laid in 1926 across the Charles River, two of the lines on the Western Avenue Bridge and the other two lines on the Cambridge Street Bridge. Pipe laying under Contract No. 69 was completed the latter part of October and the new lines were put into service December 13 after they were connected, by the Water Division maintenance force, with the existing pipe lines 48 inches in diameter that were laid in North Harvard Street and Magazine Street in 1896.

The northern roadway in Western Avenue, which was disturbed by laying the 60-inch pipe line for a distance of 3,525 feet, was resurfaced for the entire width of 16 feet under Contract No. 71 with the John McCourt Company.

The work was begun November 14 and was completed December 7. It includes the reconstruction of 6,041 square yards of Warrenite Bitulithic pavement 2 inches thick on a concrete base 6 inches thick, 453 square yards of bituminous macadam pavement 6 inches thick, and the resetting of edge-stones or granite block paving along the sidewalk for a distance of 1,183 feet. The value of the work done under Contract No. 71 is \$30,311.45.

Expenditures for the new Weston Aqueduct Supply Main and the reserves held under the contracts as of December 31, 1929, amount to \$249,479.09.

MAINTENANCE

PRECIPITATION AND YIELD OF WATERSHEDS

The total precipitation for the entire year on the Wachusett watershed is 39.93 inches, which is 5.22 inches below the average for 33 years; for the Sudbury watershed the total precipitation is 38.62 inches, which is 5.86 inches below the average for 55 years, and for the Cochituate watershed the total precipitation is 37.76 inches, which is 7.18 inches below the average for 67 years.

The precipitation on the Wachusett watershed was 4.75 inches above normal for January, February, April and May, and 9.97 inches below normal during the remainder of the year.

The precipitation was several inches above normal in April and several inches below normal in July on all of the watersheds.

The average daily yield per square mile from the Wachusett watershed was 1,031,000 gallons or 6 per cent below the average for 33 years; from the Sudbury watershed it was 905,000 gallons or 7 per cent below the average for 55 years, and from the Cochituate watershed the yield was 872,000 gallons, or 6 per cent below the average for 67 years.

Due to the large yield in 1927 and 1928, the water was only 6.3 feet below high water line in Wachusett Reservoir January 1, 1929, and by March 24 the reservoir was full. As a result of this condition it was necessary to waste

nearly ten billion gallons of water in April and May, so that little benefit was derived from the large yield during these months.

During the period February 10 to May 31, inclusive, the city of Worcester discharged 1,921,400,000 gallons of water into the Wachusett Reservoir watershed from the area formerly tributary to the reservoir which was diverted by the city for its supply in 1911, but as the Wachusett Reservoir filled before June 15, no payment is required for this water under the agreement made with the city November 2, 1914.

STORAGE RESERVOIRS

The capacities of the storage reservoirs of the Metropolitan Water Works, the elevation of the water surfaces and the quantity of water stored in each reservoir at the beginning and at the end of the year are shown by the following table:

STORAGE RESERVOIRS	Eleva- tion ¹ of High Water	Capacity (Gallons)	JAN. 1, 1929		JAN. 1, 1930	
			Eleva- tion ¹ of Water Sur- face	Amount Stored (Gallons)	Eleva- tion ¹ of Water Sur- face	Amount Stored (Gallons)
Cochituate Watershed:—						
Lake Cochituate ²	144.36	2,097,100,000	143.71	1,943,000,000	143.70	1,940,600,000
Sudbury Watershed:—						
Sudbury Reservoir	260.00	7,253,500,000	257.43	6,188,500,000	258.52	6,636,100,000
Framingham Reservoir No. 1	169.32	289,900,000 ³	167.88	223,800,000	167.75	218,300,000
Framingham Reservoir No. 2	177.87	529,900,000 ³	176.15	488,200,000	176.03	483,100,000
Framingham Reservoir No. 3	186.74	1,180,000,000 ³	185.24	1,078,300,000	184.85	1,047,100,000
Ashland Reservoir	225.21	1,416,400,000	224.56	1,380,600,000	224.39	1,371,300,000
Hopkinton Reservoir	305.00	1,520,900,000	304.28	1,475,800,000	304.09	1,464,000,000
Whitehall Reservoir	337.91	1,256,900,000	337.17	1,113,000,000	337.18	1,114,900,000
Farm Pond	159.25	167,500,000	159.14	161,600,000	158.70	138,100,000
Wachusett Watershed:—						
Wachusett Reservoir	395.00	64,968,000,000	388.70	56,696,800,000	375.90	42,036,100,000
Totals	—	80,680,100,000	—	70,749,600,000	—	56,449,600,000

¹ Elevation in feet above Boston City Base.
² Excluding Dudley Pond which was abandoned April 3, 1916.
³ To top of flashboards.

The table shows the total storage which could be drained from the reservoirs. Special provisions would be necessary, however, to draw about ten billion gallons of this storage for consumption, as it is below the outlet channels which can be conveniently used for regular service.

Wachusett Reservoir

The Wachusett Reservoir, largest of all the storage reservoirs, holds nearly 65 billion gallons of water when filled to designed high-water line, elevation 395. At the beginning of the year the water in the reservoir was 6.3 feet below high-water line and there was 56.7 billion gallons of water or 87.2 per cent of the full capacity stored in the reservoir.

The reservoir filled to elevation 395 March 24 as a result of the yield from heavy rains and melting snow on the watershed. During the following wet weather the water was allowed to rise above high-water line and was up to elevation 396.5 on April 21 and remained at about that elevation until May 27. The water was then drawn down steadily and was at elevation 375.9, about 19 feet below high water, at the close of the year, when there was 42 billion gallons of water stored in the reservoir.

The largest quantity of water stored in the reservoir during the year was 67.1 billion gallons on April 21 or 25.1 billion gallons more than at the close of the year. The quantity of water stored in the reservoir at the end of the year was 14.7 billion gallons less than at the beginning of the year.

During the spring 9,886,200,000 gallons of water, or about 15 per cent of the capacity of the reservoir, was wasted into the Nashua River below the dam. Of this amount 2,962,900,000 gallons was used to generate electric energy, which was sold to the New England Power Company and the Edison Electric Illuminating Company, jointly, for \$4,025. The maximum rate at which water was wasted from the reservoir was 1,110,000,000 gallons per day for a short time on April 22.

In compliance with the provisions of section 14 of Chapter 92 of the General Laws, at least 12 million gallons of water per week was discharged into the Nashua River from the reservoir to maintain a flow in the river below the dam.

Under the provisions of Chapter 348 of the Acts of 1923 the town of Clinton pumped a total of 129,600,000 gallons of water from the reservoir into the town's distribution system during the year. On February 13, 200,000 gallons was used to maintain pressure during a threatening fire. On the 14th and 15th of July, 600,000 gallons was used on account of a break in the town's supply line connecting with its storage reservoirs in Sterling. From August 5 to December 31, inclusive, water was pumped from Wachusett Reservoir about one-third of each day because of shortage and inferior quality of water in the town's reservoirs.

No water was pumped from the reservoir by the city of Worcester during the year.

Brush and weeds were cut along the margins of the reservoir and adjacent highways, at the north and south dikes and along the brooks and rivers which flow directly into the reservoir. This work extended over a distance of 38 miles and cost \$4,017, or about \$106 a mile.

Wire fences were erected along the property lines in Boylston, West Boylston and Sterling for a distance of 2.39 miles at a cost of about \$1,280 a mile exclusive of posts which were cut on the Water Works lands.

Riprap shore protection was placed at a cost of \$375 along the high-water line of the reservoir where eroded by wave action for a distance of 1,200 feet near the dam and in South Bay.

A one and one-half story tool and store house, 25 feet long and 18 feet wide, with concrete sidewalls and a wooden roof covered with Flintkote tile red shingles was constructed near the garage below the dam at a cost of \$2,260.

Two other one and one-half story wooden frame buildings, 80 feet long and 25 feet wide, were constructed for the storage of vehicles, lumber and miscellaneous materials, one at the Wilson Street yard in Clinton at a cost of \$1,275, and the other at the foreman's headquarters on Lancaster Street in West Boylston at a cost of \$1,025. With the exception of the Neponset shingles, roofing paper and hardware, the buildings were constructed of second-hand material obtained in connection with the removal of the buildings from the Benoit land on Lancaster Street, which was acquired January 7, 1929. The old store house at the Oakdale yard has been removed and the yard has been abandoned.

In the spring about ten tons of commercial fertilizer and a ton of salt were spread on the lawn and grassland at the dam.

Two parcels of land containing 2.96 acres located on both sides of River Street in Clinton, between Boylston Street and the driveway to the dam, were acquired from the Lancaster Mills in January, 1929, to improve the conditions at the entrance to the dam. In April, River Street was discontinued by the Worcester County Commissioners and 1.08 acres of land formerly included in the street reverted to the Commonwealth. Plans for improving the entrance include the construction of a stone wall at Boylston Street with ornamental iron gates, building a new driveway for a distance of 2,250 feet, and grading and planting the adjoining land. The work was begun early in October and was suspended for the winter about December 1, when about two-thirds completed.

A portion of the Water Works property on Main Street in Boylston, acquired from Oliver S. Kendall in 1917, was sold in November. The sales

included one parcel of land containing 3.21 acres with the house and other buildings thereon, which were purchased by Miles W. Tabor, and another small triangular-shaped parcel containing 0.04 acre was purchased by Mary S. Keogh, as it extended for a short distance along the street in front of a portion of her property.

A license was granted as of March 1, to the New England Power Company to use for the location of two 110,000-volt transmission lines for the term of 10 years and 4 months, five parcels of Wachusett Reservoir land containing about 35 acres, located in West Boylston and Sterling. For the use of this land the Company pays the Commonwealth at the rate of \$2,850 a year.

In addition to the power station and lightning arrester chamber at the dam, Water Division buildings in the vicinity of the Wachusett Reservoir now include the garage and toolhouse near the dam, the Beaven house, Kramer house and barn, garage, storage barn, storage shed, carpenter shop and blacksmith shop near Wilson Street in Clinton; the Cook house, barn, storehouse and shed on Lancaster Street and the March house, shed, barn and garage on May Street at Oakdale in West Boylston; and the Howe house, barn and shed at Sterling Junction. All of the houses are now rented, four of them to employees of the Water Division.

Sudbury Reservoir

At the beginning of the year the water in Sudbury Reservoir was at elevation 257.43 and 1.57 feet below the crest of the overflow at the dam. The flashboards were put on the entire length of the overflow April 3. Later, on July 26, some of them were removed so that water would overflow from the reservoir into Framingham Reservoir No. 3 while unit No. 3 in the power station was being repaired; these were replaced August 2, when the work was completed, and about 293 million gallons of water overflowed from the reservoir during this period. On December 2 all of the flashboards were finally removed for the winter.

The water in the reservoir was kept about a foot below the crest of the overflow when no flashboards were in use and about one-half a foot above the crest when they were in use, but on account of unexpected high water on April 17 and 18 about 2½ million gallons of water overflowed into Framingham Reservoir No. 3. From July 3 to 19 about 734 million gallons of water was by-passed to the Weston Aqueduct around units Nos. 1 and 2 at the power station while they were being repaired.

The water in the reservoir reached a maximum elevation 260.21 on April 18 and a minimum elevation 257.08 on February 6.

As usual during the winter the ice was cut away near the overflow wing-wall and pier at the dam to protect them from undesirable pressure.

The wooden steps extending from the foot to the top of the dam embankment on both sides of the spillway were rebuilt and the steps on the north side at the power station were provided with a pipe handrail and electric lights.

The usual care has been taken of the buildings and grounds and the shores of the reservoir, and although not used during the year, the Fayville swimming pool and filter-bed have been kept in good condition.

Some of the grading and other work required on the Water Works land on account of the relocation by the Department of Public Works of Boston Road at the entrance to the dam, and of Framingham Road at its junction with Boston Road, has been done during the year.

Framingham Reservoir No. 3

Flashboards were kept on the overflow of the dam at Framingham Reservoir No 3 throughout the year so that water would overflow at elevation 186.50.

All of the water drawn through the Sudbury Aqueduct for supplying the Metropolitan Water District and the town of Framingham was taken from this reservoir, which was replenished from the Sudbury Reservoir as required.

The elevation of the water in the reservoir was 185.24 at the beginning

and 184.85 at the end of the year, and varied from a minimum elevation of 184.44 in March to a maximum elevation of 186.62 in July.

During March, April, May and July more than 3 billion gallons of water was wasted through this reservoir to improve the quality of the water supply and to generate as much electric energy as possible.

The driveway, buildings and grounds at this reservoir have been kept in good condition and the lanes along the property lines have been cleared of sprouts and brush.

Ashland, Hopkinton and Whitehall Reservoirs

No water was drawn from Ashland, Hopkinton or Whitehall reservoirs for water supply during the year, but the water in Hopkinton Reservoir was drawn down about 6 feet, to elevation 299, to provide for experimental work on the pipe line from Hopkinton Reservoir to Sudbury Reservoir in April.

In connection with these experiments 1.8 million gallons of water was drawn from Hopkinton Reservoir to Sudbury Reservoir, and during cold weather a small flow of water was maintained in the pipe line from Whitehall Reservoir to Hopkinton Reservoir to keep the water in the pipe line from freezing. Except as noted, the water in all of these reservoirs was kept about at the elevation of the overflows.

The lands and buildings at these reservoirs have been cared for in the usual manner and the lanes along the boundary lines have been cleared of sprouts and brush.

Framingham Reservoirs Nos. 1 and 2 and Farm Pond

As Framingham Reservoirs Nos. 1 and 2, Farm Pond and the watershed tributary thereto are not now used as a source of supply for the Water District, the yield of this portion of the Sudbury watershed has been wasted into the river below Dam No. 1. It has, however, been necessary to keep the Water Works lands and structures at these reservoirs in good condition.

The town of Framingham continued to pump about a third of its supply from the filter gallery on the shore of Farm Pond until October 24, taking about 167.5 million gallons from this source this year.

Under rights reserved by legislation the Boston & Albany Railroad took approximately 51.4 million gallons of water and the New York, New Haven & Hartford Railroad 12 million gallons from Farm Pond for use in locomotives.

Including a flow of 1.5 million gallons a day required by chapter 177 of the Acts of 1872, the total quantity of water wasted from the Sudbury watershed into the river below Dam No. 1 was 19,118.1 million gallons.

Lake Cochituate

No water was used from Lake Cochituate during the year. At the beginning and at the end of the year the water in the lake was at elevation 143.7 and 0.66 of a foot below high-water line. During the year the water varied from a minimum elevation of 142.85, in April, to a maximum elevation of 144.61 in December, and about 5.4 billion gallons of water was wasted at the dam at the outlet.

The driveways and grounds about the dam, foreman's headquarters and gate-house, and the shores of the lake have been kept in good order; dead and broken trees have been cut on the Water Works lands, and brush, weeds and sprouts have been mowed in the lanes along the property lines and along Bannister's Brook and the surface water drain that diverts the surface drainage of Cochituate Village outside the watershed.

AQUEDUCTS

The *Wachusett Aqueduct* was used on 303 days during the year, for a total time of 140 days and 23 hours. The total quantity of water drawn from the Wachusett Reservoir through the aqueduct is 46,655,600,000 gallons, an average draft of 127,824,000 gallons for every day in the year and all

of the water was used to generate electric energy at the Wachusett Power Station.

The Westborough State Hospital pumped 82,302,000 gallons of water from the aqueduct at the terminal chamber in Marlborough during the year, an average daily pumpage of 225,000 gallons.

About 50 cubic yards of rock which had fallen from unlined portions of the tunnel were placed in recesses on the sides where they would not obstruct the flow of water through the tunnel, and the invert was cleaned with wire brooms.

The driveway at the top of the slope on the northerly side of the open channel was rebuilt for a distance of 500 feet above the upper dam, and the granite curbing on a retaining wall at the lower dam was raised about 6 inches for a distance of 75 feet to confine to the channel the water flowing over the dam into the Sudbury Reservoir.

The *Weston Aqueduct* was used on 363 days, the total time in service amounting to 306 days, 19 hours and 40 minutes, during which time 37,309,-100,000 gallons of water flowed from Sudbury Reservoir into Weston Reservoir, equivalent to an average flow of 102,216,712 gallons per day for the entire year.

About 800,000 gallons of water was wasted from the aqueduct to provide for the relocation of the air valve on the steel pipe arch over the Sudbury River in Wayland. The old wooden foot bridge on the pipe arch was replaced by a steel structure, under Contract No. 37-M, by the W. A. Snow Iron Works, Incorporated, at a cost of \$1,678.

On June 24 the old barn at the White place in Nobscot was destroyed by fire.

The fences, walks, driveways and culverts along the line of the aqueduct received the necessary care; the grass, weeds and brush were mowed and the ironwork at the masonry chambers was painted.

The *Sudbury Aqueduct* was in continuous use and was supplied wholly from Framingham Reservoir No. 3. The total quantity of water admitted to the aqueduct was 14,125,400,000 gallons, of which the town of Framingham pumped 399,358,000 gallons from the aqueduct for its water supply, and 13,726,100,000 gallons, equivalent to an average of 37,605,753 gallons per day, was delivered into Chestnut Hill Reservoir for Metropolitan Water District consumption.

Current meter determinations of the flow in the aqueduct gave coefficients of flow for the recording gage in the Farm Pond gate-house varying from 93.4 per cent in January to 88.4 per cent in October.

Fences, culverts, bridges, masonry chambers and aqueduct lands have been maintained in the usual manner.

During the year a parcel of Sudbury Aqueduct land on Duncklee Street in Newton, containing 1,200 square feet, was sold to Robert L. Ryder.

Although the *Cochituate Aqueduct* was not used it was kept ready for service and the lands and structures were maintained as usual.

During the year flowage rights in 9,389 square feet of Cochituate Aqueduct land near the ventilator in Newton were released to the Woodchester Realty Trust, and a parcel of Cochituate Aqueduct land on Waban Avenue in Newton, containing 833 square feet, was sold to Marjorie R. Ayer.

PROTECTION OF THE WATER SUPPLY

To prevent pollution of the water supply a sanitary engineer, a sanitary engineering aid, six watchmen and a construction handyman have been employed to inspect the condition of the premises, ice cutting and other operations on the watersheds, and to enforce the sanitary rules and regulations.

The Water Division operated filter-beds on Beaman Street in West Boylston throughout the year to purify the sewage from the Worcester County Training School, and the Gates Terrace filter-beds at Sterling Junction from June 1 to October 31 to purify the sewage from summer cottages in that vicinity.

Sewage from the Eagleville Mill and the Mt. Pleasant House in Holden, from the Fay School and Deerfoot Farm sausage factory and dairy in Southborough was purified by privately-owned filter-beds.

Surface water from a drainage area of 525 acres in the village of Sterling, from 1,280 acres along the brook near Maple Street in Marlborough and from 700 acres along Pegan Brook and the intercepting ditch in Natick was purified by filters operated by the Water Division before it flowed into the water supply, with the exception of 2.4 million gallons of water which overflowed into Sudbury Reservoir from the brook in Marlborough and 18.8 million gallons of water that overflowed from Pegan Brook and 72.6 million gallons from the intercepting ditch into Lake Cochituate. All of the water that overflowed from these places was sterilized with calcium hypochlorite before it entered the reservoirs.

At the Pegan Brook filters the pumping station was operated on 217 days and 229,359,000 gallons of water was pumped to the filters, an average of 628,380 gallons per day for the year. The cost of operating the station and caring for grounds and filter-beds was \$5,823.03 for labor, \$412.27 for fuel and \$235.20 for supplies and repairs, a total of \$6,470.50, which is \$28.21 per million gallons filtered. The fuel cost per million foot gallons was \$0.1595.

The cost of protecting the water supply by filtration and chlorination was \$1,003 for the Wachusett, \$5,429.94 for the Sudbury and \$6,470.50 for the Cochituate watershed.

Improved brook channels, ditches, culverts and watering places were maintained in the usual manner. The cost of maintaining the 37 miles of drainage ditches on all of the watersheds was \$6,085.

For the protection of the water supply property was acquired on the Wachusett watershed, in West Boylston from Marie R. D. Benoit 0.34 acre of land with the dwelling house thereon, and from Pelino Mascitti 12.33 acres of land; in Sterling from Pelino Mascitti 12.27 acres of land; in Rutland from the Kicker Car Company 0.19 acre of land and in Holden from the Kicker Car Company 28 acres of land, a stone box mill and a wooden sawmill thereon, and from the Quinapoxet Manufacturing Company 206.35 acres of land and the large brick mill with storehouse and out-buildings, 16 tenement houses containing 34 tenements and a store and post office. When acquired, 18 of the tenements and the store and post office were occupied, and all tenants were notified to vacate by April 1, 1930. At the close of the year 14 tenements and the store were occupied at Quinapoxet and there were 2 tenants remaining on the Water Works property acquired at Dawsonville in Holden in 1926.

A new cesspool 18 feet in diameter and 20 feet in depth was constructed at the Eagleville Mill in Holden. It is about 50 feet north of the old cesspool and is connected therewith by a 6-inch pipe about mid-depth.

CLINTON SEWAGE DISPOSAL WORKS

The works constructed under the provisions of Acts of 1898, chapter 557, for disposing of the sewage of the town of Clinton, were operated on 343 days and were idle on the remaining 22 days, during which the flow of sewage augmented by large quantities of ground water leakage exceeded the capacity of the pumping station and overflowed into the Nashua River, which was at the time flowing in sufficient volume, due to waste of water at Wachusett Dam, to properly dispose of the dilute sewage.

The cost of operating the pumping station was \$3,381.31, which is \$7.47 per million gallons and is \$0.15 per million foot gallons. The cost of operating the filters and intercepting sewer was \$10,153.58, which is \$22.42 per million gallons disposed of by sedimentation, filtration and irrigation.

FORESTRY

In the Wachusett Section 38,750 white pine, 61,200 red pine, 2,500 white spruce, 5,250 arbor vitae and 450 mugho pine trees were set out in new plantings.

In the Sudbury section 1,100 white pines were set out to fill in previous

plantings at Whitehall Reservoir and about 3,400 pines were planted in the Distribution Section.

The total expenditure for forestry was \$31,500, of which \$5,478.30 was expended for protecting the trees and shrubs from insects.

HYDROELECTRIC SERVICE

New contracts were executed as of March 1 for the sale and purchase of the electric energy generated in connection with the operation of the Metropolitan Water Works.

Under the new contracts the energy sold at the station at the Wachusett Dam in Clinton is purchased jointly by the New England Power Company and The Edison Electric Illuminating Company of Boston as formerly, but at a price of \$6.25 per 1,000 kilowatt hours, an increase of about 18 per cent over the former price; and the energy sold at the Sudbury Dam in Southborough is purchased by The Edison Electric Illuminating Company of Boston at a price of \$6.25 per 1,000 kilowatt hours, as formerly.

From both of these hydroelectric stations, which are operated by the water drawn from the Wachusett and Sudbury reservoirs, 15,880,663 kilowatt hours of electric energy was delivered during the year.

The value of this energy at contract prices and of rentals for transmission line locations on Water Works land in connection with this service is \$96,759.13. The expenditures charged to operation of both stations and the Water Division transmission lines is \$62,258.87, leaving a profit from the operations of \$34,500.26.

Wachusett Station

A contract was made with the Westinghouse Electric & Manufacturing Company late in the year for the installation of new switching equipment at the Wachusett hydroelectric station.

The statistics for this station, which was operated on 303 days, are as follows:

Total energy developed (kilowatt hours)	10,518,200
Energy used at power station (kilowatt hours)	69,089
Available energy (kilowatt hours)	10,449,111
Water used (gallons)	49,617,200,000
Average head (feet)	91.9
Energy developed per million foot gallons (kilowatt hours)	2.307
Efficiency of station (per cent)	73.4

Credits:

Energy sold New England Power Company and Edison Electric Illuminating Company:

1,259,523 kilowatt hours at \$0.0053	\$6,675.47
9,016,295 kilowatt hours at \$0.00625	56,351.84
	\$63,027.31

Deduction of 2 per cent as provided in contracts:

25,190 kilowatt hours at \$0.0053	\$133.51
180,326 kilowatt hours at \$0.00625	1,127.04
	1,260.55
	\$61,766.76

Energy furnished Clinton Sewerage
Pumping Station:

39,906 kilowatt hours at \$0.0053	\$211.50	
133,387 kilowatt hours at \$0.00625	833.67	
Rental, transmission line location	30.37	
		1,075.54
		\$62,842.30
Charges:		
Superintendence	\$1,434.32	
Labor, operating station	9,205.59	
Repairs and supplies:		
Power station	1,835.88	
Transmission line	252.42	
		\$12,728.21
Replacement of protective apparatus	8,700.00*	
Taxes	3,000.00	
Administration, general supervision, interest and sinking fund	11,982.73	
		\$36,410.94
Profit		\$26,431.36
Cost of available energy per thousand kilowatt hours		\$3.485

Sudbury Station

The Sudbury hydroelectric station was operated every day during the year; for the entire 24 hours on 215 days and for 16 hours only on 150 days. During July worn and broken pins, links and wicket gates were replaced on all three of the water wheels.

The statistics for this station are as follows:

Total energy developed (kilowatt hours)	5,480,170	
Energy used at power station (kilowatt hours)	48,618	
Available energy (kilowatt hours)		5,431,552
Framingham Reservoir No. 3 service:		
Water used (gallons)		16,602,100,000
Average head (feet)		65.91
Weston Aqueduct service:		
Water used (gallons)		36,576,100,000
Average head (feet)		38.65
Energy developed per million foot gallons (kilowatt hours)		2.185
Efficiency of station (per cent)		69.6

Credits:

Energy sold Edison Electric Illuminating Company of Boston 5,431,552 kilowatt hours at \$0.00625		\$33,947.20
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Charges:

Superintendence	\$1,911.34	
Labor, operating station	13,830.60	
Repairs and supplies	1,708.79	
		\$17,450.73
Taxes	1,674.00	
Administration, general supervision, interest and sinking fund	6,723.20	
		\$25,847.93
Profit		\$8,099.27
Cost of available energy per thousand kilowatt hours		\$4.759

* Contracted for but not expended.

DISTRIBUTION PUMPING STATIONS

The total pumpage at the five distribution pumping stations was 29.514 billion gallons, an increase of 2.52 billion gallons over the 1928 pumpage.

At the beginning of the year there was 1,290 net tons of bituminous coal and 50 net tons of anthracite screenings on hand at the pumping stations; the amount on hand at the end of the year was 2,120 net tons of bituminous coal and 310 net tons of anthracite screenings.

At the Chestnut Hill Stations 18.087 billion gallons of water was pumped for the southern high service and for a portion of the supply of the town of Brookline and of the city of Newton, and 5.925 billion gallons was pumped for the low service.

At the Spot Pond Station 4.384 billion gallons of water was pumped for the northern high service, at the Arlington Station 595 million gallons was pumped for the northern extra high service and at the Hyde Park Station 524 million gallons was pumped for the southern extra high service.

The average engine duties at these stations based on plunger displacement and total coal used for all purposes, including heating and lighting of the stations, are as follows:—

Chestnut Hill Station No. 1, 129,150,900 foot pounds per 100 pounds of bituminous coal averaging 14,400 British thermal units per pound.

Chestnut Hill Station No. 2, 140,633,600 foot pounds per 100 pounds of bituminous coal averaging 14,400 British thermal units per pound.

Spot Pond Station, 109,840,900 foot pounds per 100 pounds of mixed bituminous and anthracite coal averaging 14,000 British thermal units per pound. The fires are banked for a portion of each day at this station.

Arlington Station, 95,444,300 foot pounds per 100 pounds of mixed bituminous and anthracite coal averaging 14,300 British thermal units per pound.

Hyde Park Station, 73,105,200 foot pounds per 100 pounds of mixed bituminous and anthracite coal averaging 14,000 British thermal units per pound. The fires are banked for a portion of each day at this station.

By an arrangement with the city of Newton 530,090,000 gallons of water was pumped from November 16, 1928, to November 26, 1929, by the city at its Ward Street booster station for use on the high land in Belmont and Watertown where satisfactory service cannot be furnished from the Chestnut Hill Station, and for this pumping the Commonwealth has paid the city \$4,592.79.

The old wooden coal bins at Chestnut Hill Station No. 1, which were partially destroyed in January, 1924, by a fire resulting from the heating of the coal stored therein, were removed and a concrete wall was built up on two sides and, with the end and rear wall of the coal shed formed one large bin in place of the four bins originally provided.

Pointing of the stone and brick masonry of Chestnut Hill Station No. 1, both inside and outside, was begun September 30, and as no pointing of any importance had been done on the building since it was erected in 1887, it has been necessary to do a large amount of work in order to restore the masonry to good condition and the pointing was not completed at the end of the year.

Special equipment has been made at the machine shop for increasing the capacity of No. 10 engine at the Arlington Station from 1.5 to 2 million gallons a day by installing larger pump plungers.

The two low-pressure cylinder exhaust valves of No. 16 engine at Chestnut Hill Pumping Station No. 1 were replaced with new valves of an improved design, from which considerable benefit has been obtained.

Very complete general repairs have been made at all of the stations, including replacement of piston rings, pump valves, and springs, replacing of valve stems, overhauling of oiling systems, governors, feed pumps, air compressors, electric lighting equipment, and replacing boiler stay bolts. Boilers and economizers have been scaled and washed out, Venturi meters and pressure gages have been cleaned, oiled and adjusted and the pumping stations have been thoroughly cleaned up and the woodwork and ironwork has been painted or varnished. Considerable work has been done at the pumping service machine shop for other sections of the Water Division.

DISTRIBUTION RESERVOIRS

The locations, elevations and capacities of the distribution reservoirs of the Metropolitan Water Works are shown by the following table:—

DISTRIBUTION RESERVOIRS AND LOCATIONS	Elevation of High Water ¹	Capacity in Gallons
Low Service:		
Spot Pond, Stoneham and Medford	163.00	1,791,700,000
Chestnut Hill Reservoir, Brighton district of Boston	134.00	300,000,000
Weston Reservoir, Weston	200.00	200,000,000
Mystic Reservoir, Medford	157.00	26,200,000
Northern High Service:		
Fells Reservoir, Stoneham	271.00	41,400,000
Bear Hill Reservoir, Stoneham	300.00	2,450,000
Northern Extra High Service:		
Arlington Reservoir, steel tank, Arlington	442.50	2,000,000
Southern High Service:		
Fisher Hill Reservoir, Brookline	251.00	15,500,000
Waban Hill Reservoir, Newton	264.50	13,500,000
Forbes Hill Reservoir, Quincy	192.00	5,100,000
Forbes Hill Standpipe, Quincy	251.00	330,000
Southern Extra High Service:		
Bellevue Reservoir, steel tank, West Roxbury district of Boston	375.00	2,500,000
Total	—	2,400,680,000

¹ Elevation in feet above Boston City Base.

Powder Horn Hill Reservoir of the city of Chelsea is used when necessary for the northern high service. It has a capacity of 1,000,000 gallons with high-water line at elevation 196.6, and was in service from January 1 to April 9 and from December 10 to the end of the year.

The Mystic and Forbes Hill reservoirs have been kept full of water ready for an emergency, but were not used during the year.

The Lawrence Basin of the Chestnut Hill Reservoir was out of service July 16 to August 8 and about 9 hours on August 14.

The Arlington Reservoir Standpipe was shut off for inspection September 30 and was put into service again October 7.

All other distribution reservoirs were in regular service throughout the year.

In November, 1928, a contract was made with the Security Fence Company of Somerville for furnishing and erecting a fence on the northerly side of Bradlee Basin of Chestnut Hill Reservoir. This work was completed June 1. Another contract was made with the Company for furnishing and erecting a fence on the southerly side of the basin; work under this contract was completed November 25. The Bradlee Basin is now entirely enclosed. The fence is 8,125 feet in length and includes 5,411 feet of painted steel picket fence and 1,714 feet of galvanized steel chain link fence. In connection with this work the maintenance force reconstructed of cinders and stone dust about a mile of the gravel walks on the southerly side of the basin, including 480 feet of walks on sloping ground where cold patch was used for surface binder.

In June about 2,000 dead fish, largely white perch, were taken from the reservoir. This condition was investigated by the Division of Fisheries and Game of the Department of Conservation, which reported a fungus infection known as Saprolegnia as the ultimate cause of death, and that “as a rule it is a secondary rather than a primary invader, and attacks fish in a weakened condition. In this case there was no evidence of any primary invader, and it would seem that the fungus infection had attacked the fish weakened from some external condition. White perch are a susceptible species. Similar instances have been noted where during the late spring and early summer, white perch die in large numbers, showing only fungus infection. Mechanical injury such as scraping the scales subjects the fish to fungus infection. The Saprolegnia are as a rule saprophytes and grow on dead or devitalized tissue. It would appear that the recent rise in tem-

perature favored the rapid development of Saprolegnia, tended to lower the vitality of the fish in a delicate species, and therefore has resulted in the present loss of white perch."

On account of an accumulation of organic material in the lower end of the Weston Aqueduct below the Weston Reservoir, which caused a serious obstruction on the screens at the inlet of the supply pipe lines, this section of the aqueduct and the connecting supply mains was shut off on July 20. About 25 cubic yards of gelatinous organic matter and sediment was removed in buckets and a large amount of material washed from the sides of the aqueduct flowed out with the water at the blow-offs. The aqueduct and the steel supply main to Arlington and Medford was put into service again on July 22 and the 48-inch and 60-inch cast-iron mains through Newton to Boston were put in service again on July 23.

The towers at the Arlington and Bellevue reservoirs were open to the public on Sundays and holidays during the summer. The grounds and structures at all of the distribution reservoirs have been cared for by the regular forces and kept in good condition.

The Parks Division was paid \$4,100.26 for police service at Chestnut Hill Reservoir and \$1,144.10 for service at Spot Pond and the Fells and Bear Hill reservoirs.

DISTRIBUTION PIPE LINES

In connection with the widening and rebuilding of the Adams Street Bridge in Milton by the Boston Transit Department, a temporary flanged steel pipe line 20 inches in diameter was laid to maintain the water supply for the town of Milton and the city of Quincy through the two lines of 24-inch cast-iron pipes in Adams Street. The two lines of riveted steel pipe were then removed from the easterly sidewalk of the old bridge to provide for the construction of the easterly side of the new bridge and after this work was completed two new permanent lines of electric welded steel pipe 23½ inches in diameter were laid over the new bridge and were connected with the two existing 24-inch cast-iron pipe lines in Adams Street, and the temporary 20-inch pipe line was removed. This work was done by the Water Division between May 14 and August 30 at a cost of \$7,914.60 and the city of Boston reimbursed the Division for this expenditure.

The College Avenue pipe bridge over the Boston & Maine Railroad in Medford was raised 1 inch by the Railroad Company to provide for the installation of new and heavy rails.

The new 30-inch northern high-service main was put into service November 18 and the lower section of the new Weston Aqueduct supply main was put into service December 13.

Early in February the break in the 8-inch pipe line in the Chestnut Hill Pumping Station grounds, from which water had been leaking for some time, was located and repaired.

On October 10 a break occurred in the 20-inch northern high-service pipe line at the Medford shore of the Mystic River crossing. On account of the unfavorable conditions at this place repairs were not completed until December 2.

On December 14 a break occurred in the 48-inch main in Clinton Road at Chesham Street in Brookline. Prompt notice was received of this break and the water was shut off before any property was damaged.

The cost of repairing these breaks was \$1,909.81.

During the year 18 leaks were repaired at wooden joints at a cost of \$2,915.51, and 31 other leaks, including 23 at lead joints, 2 on lead services, 4 on calomine pipe and 2 on 30-inch cement pipe, were repaired at a cost of \$3,133.09.

The usual maintenance work has been done in connection with the operation of the pipe lines.

The 6-inch by 3-inch Hersey detector meter at Alewife Brook Parkway, near the Mystic shops, supplying a section of the low service of Somerville, was replaced with a 12-inch by 4-inch Venturi meter June 5. A 12-inch by

4-inch Venturi meter was installed at the emergency connection on Middlesex Avenue at Second Street in Medford in October.

There are 80 Venturi meters varying in size from 6 to 60 inches in diameter in the distribution pipe lines; 68 of these are on connections supplying various towns in the Metropolitan Water District, 4 are on the Weston Aqueduct supply mains, 1 at each of the pumping stations at Arlington, Hyde Park and Spot Pond, 1 at each of the emergency connections in Cambridge, Newton and Wakefield, 1 on the service connection to the Walter E. Fernald State School and Metropolitan State Hospital in Waltham, and 1 on the connection between the high-service and low-service mains at Chestnut Hill Reservoir. There are also 9 disc and 12 detector meters in use for measuring small quantities of water supplied at various places.

Of the 10 pressure regulating valves for reducing pressure of water supplied to Revere, Swampscott and Winthrop and portions of Chelsea, East Boston and Hyde Park, 7 are in regular use and the others are kept in good order for emergency use.

Recording pressure gages have been maintained at 32 places on the distribution system and tables in the Appendix show the hydraulic grade at 17 of these stations as determined by the charts.

Pipes, specials and other materials and supplies required for maintaining and operating the pipe lines are kept on hand at the Glenwood pipe yard in Medford and Chestnut Hill pipe yard in Brighton.

Auto trucks equipped with gate-operating attachments have been maintained with men on duty ready to operate them in case of emergency at any time during the day or night.

CONSUMPTION OF WATER

During the year 50,021,177,000 gallons of water was furnished from the Metropolitan Water Works to the 18 cities and towns regularly supplied. This is equivalent to an average daily consumption of 137,044,300 gallons, and for the estimated population of 1,381,520 is at the rate of 99.2 gallons per capita.

The town of Brookline with an estimated population of 46,180, used from its local source 1,645,528,370 gallons of water, of which 367,333,195 gallons was supplied from elevation 375 and 1,278,195,175 gallons was supplied from elevation 250. In addition to this consumption the town was supplied with some water from the Metropolitan Water Works every month in the year except February and March. The total quantity supplied from the Metropolitan Water Works is estimated as 76,000,000 gallons, making the total average daily consumption of the town 4,716,600 gallons, equivalent to 102 gallons per capita.

The city of Newton, with an estimated population of 58,670, was supplied from its local source, with the exception of 514,516,000 gallons, which was furnished from the Metropolitan supply. Including this water, the average daily consumption was 4,746,800 gallons, equivalent to 81 gallons per capita. The amount of water furnished the city of Newton from the Metropolitan supply is 501,016,000 gallons in excess of the quantity to which the city is entitled to take free of charge under the agreement made in 1900 when the Waban Hill Reservoir was purchased from the city, and for this water the city will pay \$38,493.06.

Through the Quincy distribution system the United States Government Reservation on Peddock's Island was supplied with 2,786,000 gallons of water and the town of Braintree was supplied with 245,000 gallons. The town of Winchester was supplied with 574,000 gallons of water through the Arlington system and the town of Saugus was supplied with 603,000 gallons through the Melrose system.

The population, consumption of water and per cent of services metered in the Metropolitan Water District as supplied in 1929 and for the period from 1890 to 1929, inclusive, are shown graphically by the accompanying diagram.

The average daily consumption of water in each of the municipalities in the Metropolitan Water District during 1928 and 1929 is as follows:

	Estimated Popula- tion, 1929	AVERAGE DAILY CONSUMPTION				Increase in Gallons
		1928		1929		
		Gallons	Gallons per Capita	Gallons	Gallons per Capita	
Arlington	28,650	1,717,500	62	1,863,900	65	146,400
Belmont	17,890	1,079,100	62	1,263,200	71	184,100
Boston	814,620	94,570,000	117	93,832,100	115	737,900 ¹
Chelsea	49,490	3,618,700	74	3,610,800	73	7,900 ¹
Everett	43,230	5,038,800	117	5,066,600	117	27,800
Lexington	8,610	637,900	76	656,500	76	18,600
Malden	53,580	3,446,700	65	3,692,600	69	245,900
Medford	53,610	2,902,700	56	3,325,700	62	423,000
Melrose	21,650	1,420,000	67	1,502,200	69	82,200
Milton	14,610	740,000	52	829,900	57	89,900
Nahant	1,770	171,200	98	208,000	118	36,800
Quincy	68,130	5,195,600	78	5,596,500	82	400,900
Revere	36,540	2,272,000	64	2,234,400	61	37,600 ¹
Somerville	103,860	8,307,800	81	8,581,600	83	273,800
Stoncham	9,830	568,200	59	667,100	68	98,900
Swampscott	9,480	706,700	76	738,500	78	31,800
Watertown	28,330	2,229,600	81	2,216,700	78	12,900 ¹
Winthrop	17,640	1,070,700	62	1,158,000	66	87,300
District supplied	1,381,520	135,693,200	100	137,044,300	99	1,351,100
Brookline	46,180	4,394,100	97	4,716,600	102	322,500
Newton	58,670	4,360,400	76	4,746,800	81	386,400
Total District	1,486,370	144,447,700	99	146,507,700	99	2,060,000

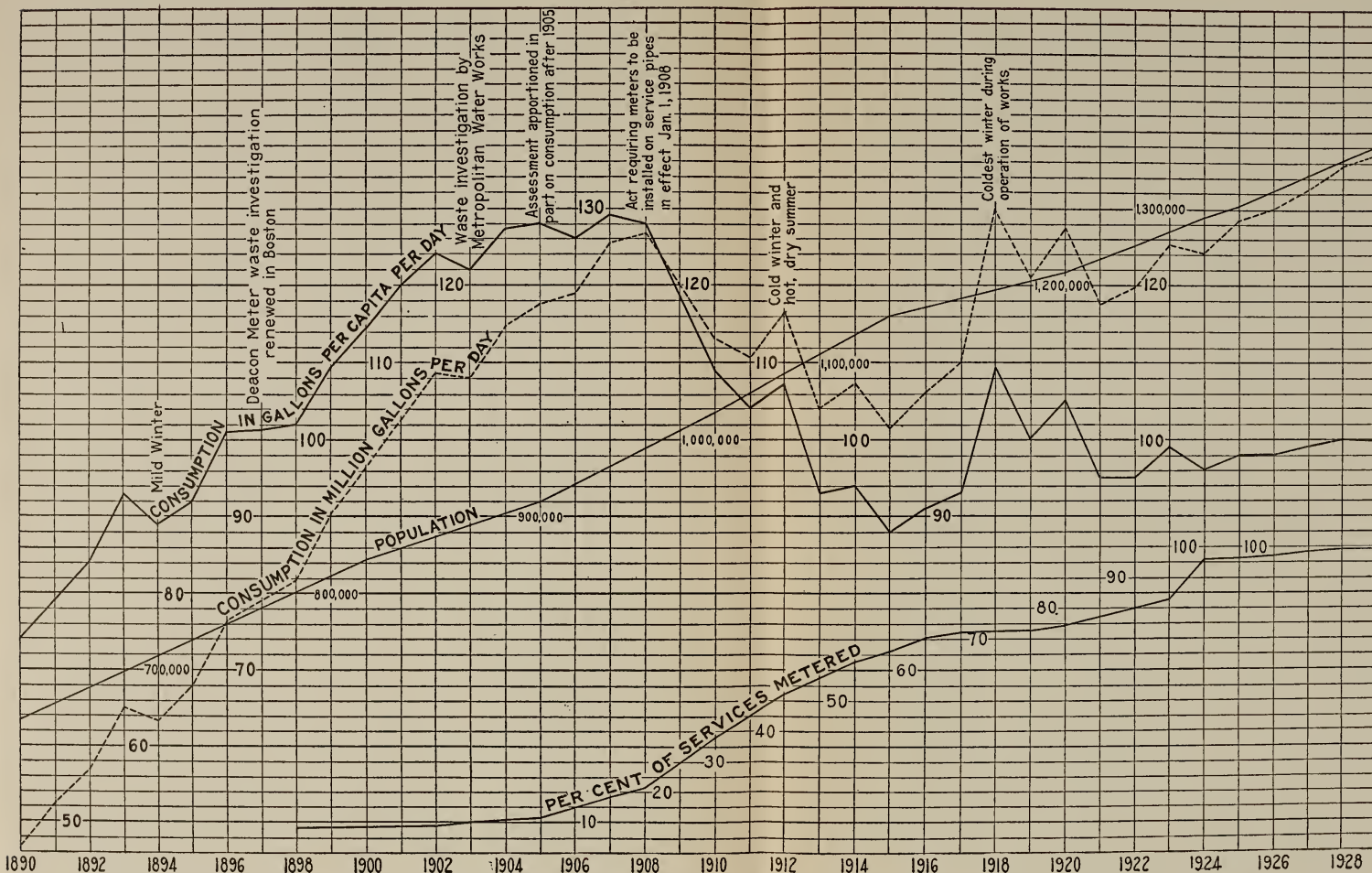
¹ Decrease.

The consumption by districts in 1929 as compared with 1928 is as follows:

	Gallons per Day 1929	INCREASE FROM 1928	
		Gallons per Day	Percent- age
Low service district, embracing the low-service districts of Arlington, Belmont, Boston, Chelsea, Everett, Malden, Medford, Somerville and Watertown	72,747,400	770,100 ¹	1.05 ¹
Southern high-service district, embracing Quincy, the high-service district of Boston, except East Boston, and portions of Milton and Watertown	47,387,600	786,400	1.69
Southern intermediate high-service district, embracing portions of Belmont and Watertown	1,413,600	194,400	15.94
Northern high-service district, embracing Melrose, Nahant, Revere, Stoneham, Swampscott, and Winthrop and the high-service districts of Chelsea, East Boston, Everett, Malden, Medford and Somerville	12,366,900	800,200	6.92
Southern extra high-service district, embracing the higher portions of Hyde Park, Milton and West Roxbury	1,504,500	162,400	12.10
Northern extra high-service district, embracing Lexington and the higher portions of Arlington and Belmont	1,624,300	177,800	12.29
District Supplied	137,044,300	1,351,100	1.00
Brookline and Newton	9,463,400	708,900	8.10
Total District	146,507,700	2,060,000	1.43.

¹ Decrease.

POPULATION, CONSUMPTION OF WATER AND PER CENT OF SERVICES METERED
IN THE
METROPOLITAN WATER DISTRICT
AS SUPPLIED IN 1929
FROM 1890 TO 1929



Note: Estimated population and consumption per capita given on diagram published in annual reports 1916 to 1924 inclusive have been revised and are here shown in accordance with the 1925 census

PLACES WHERE WATER IS USED	Total Quantity (Gallons)	Average Quantity (Gallons per Day)	Amount Charged
Town of Rutland	111,000,000 ¹	304,000	—
Town of Holden	21,300,000 ²	58,000	—
Town of Clinton	129,600,000	355,000	—
Westborough State Hospital	82,302,000	225,000	\$2,469.06
Town of Westborough	71,000,000	194,521	—
Town of Hopkinton	1,995,000 ²	5,466	—
Town of Ashland	60,225,000 ²	165,000	—
Town of Framingham	566,841,000	1,552,989	16,295.89
Town of Natick	276,080,000	756,384	—
Town of Wayland	7,800,000	21,369	—
United States Army Reservation at Peddock's Island in Hull	2,786,000	7,633	242.55 ³
Portion of Town of Braintree	245,000 ⁴	671	—
Portion of Town of Winchester	574,000 ⁵	1,573	—
Portion of Town of Saugus	603,000 ⁶	1,652	—
Metropolitan Parks, Middlesex Fells	6,294,000	17,244	—
Walter E. Fernald State School and Metropolitan State Hospital	70,325,000	192,700	5,028.94

Notes. — Water is used throughout the year in all places except the town of Clinton, which took water on 152 days; the town of Hopkinton, which took water on 83 days, and the town of Wayland which took water on 243 days.

The average daily use is in all cases figured on basis of 365 days.

Water was furnished the town of Brookline through the unmetered connection in Fisher Avenue for various periods in every month except February and March.

Through the emergency connection on Ward Street near Hammond Street, water was furnished to the city of Newton every month during the year except April, the total quantity supplied being 514,516,000 gallons, or 501,016,000 gallons in excess of the quantity that the city is entitled to take free of charge under the agreement made in 1900 when the Waban Hill Reservoir was purchased from the city, and for this water the city will pay \$38,493.06.

¹ All but 400,000 gallons diverted from watershed.

² Not diverted from watershed.

³ Water supplied by the Commission through City of Quincy pipes, and by agreement revenue is divided in equal shares between the City and Commonwealth.

⁴ The City of Quincy supplies the water at regular rates and pays the Commonwealth by an addition to its regular apportionment.

⁵ The Town of Arlington supplies the water at regular rates and pays the Commonwealth by an addition to its regular apportionment.

⁶ The City of Melrose supplies the water at regular rates and pays the Commonwealth by an addition to its regular apportionment.

Information regarding the installation of meters on service pipes by the municipalities supplied with water from the Metropolitan Water Works for the year 1929 and other statistics are given in tables in the Appendix.

Respectfully submitted,

WILLIAM E. FOSS,
Director and Chief Engineer.

Boston, January 2, 1930.

REPORT OF DIRECTOR AND CHIEF ENGINEER
OF SEWERAGE DIVISION

DAVIS B. KENISTON, *Commissioner, Metropolitan District Commission.*

DEAR SIR:—The following report of the operations of the Metropolitan Sewerage Works for the year ending December 31, 1929, is respectfully submitted:

ORGANIZATION

The Director and Chief Engineer has charge of the design and construction of all new works, and of the maintenance and operation of all the works controlled by the Metropolitan District Commission for removing sewage from the thirty-two municipalities which comprise the Metropolitan Sewerage Districts.

The following assistants have been employed during the year: Henry T. Stiff, Associate Civil Engineer, in charge of office and drafting room and of the construction work.

Charles F. Fitz, Assistant Civil Engineer, in charge of maintenance studies and of maintenance construction work on the North Metropolitan System.

Ralph W. Loud, Assistant Civil Engineer, in charge of survey work and field work in connection with the New Neponset Valley Sewer construction.

Benjamin Rubin, Assistant Civil Engineer, in charge of survey work and field work in connection with the New Mystic Valley Sewer construction.

Arthur F. F. Haskell, Superintendent, North Metropolitan Sewerage District.

Frank B. Williams, Superintendent, South Metropolitan Sewerage District.
In addition to the above, the maximum number of engineering and other assistants employed during the year was 30, which includes 4 assistant engineers, 7 instrumentmen, 1 supervising sewer construction inspector, 4 inspectors, 1 draftsman, 10 rodmen and engineering assistants, 1 chauffeur and 2 stenographers.

METROPOLITAN SEWERAGE DISTRICTS
AREAS AND POPULATIONS

During the year the area of the Metropolitan Sewerage Districts has been increased in the South District by the addition of the town of Braintree as provided by Chapter 546 of the Acts of 1910.

The populations of the districts, as given in the following table, are based on the census of 1925.

Table showing Ultimate Contributing Areas and Present Estimated Populations within the Metropolitan Sewerage Districts, as of December 31, 1929.

CITY OR TOWN		Area (Square Miles)	Estimated Population
North Metropolitan District	Arlington	5.20	29,070
	Belmont	4.66	18,200
	Boston (portions of)	3.45	106,490
	Cambridge	6.11	129,010
	Chelsea	2.24	49,740
	Everett	3.34	43,360
	Lexington ¹	5.11	5,630
	Malden	5.07	53,790
	Medford	8.35	54,300
	Melrose	3.73	21,830
	Reading	9.82	9,650
	Revere	5.86	36,920
	Somerville	3.96	104,430
	Stoneham	5.50	9,910
	Wakefield	7.65	16,650
	Winchester	5.95	12,410
	Winthrop	1.61	17,820
	Woburn	12.71	19,400
		100.32	738,610
South Metropolitan District	Boston (portions of)	24.96	340,260
	Braintree	13.44	14,830
	Brookline	6.81	46,590
	Canton	17.84	5,900
	Dedham ¹	9.40	14,600
	Milton	12.59	14,800
	Needham	12.50	9,910
	Newton	16.88	59,330
	Norwood	10.16	15,690
	Quincy	12.56	69,070
	Stoughton	16.23	8,890
	Walpole	20.54	7,660
	Waltham	13.63	36,790
	Watertown	4.04	28,670
	Wellesley	9.89	9,920
		201.47	682,910
Totals		301.79	1,421, 520

¹ Part of town.

METROPOLITAN SEWERS

SEWERS PURCHASED AND CONSTRUCTED AND THEIR CONNECTIONS

During the year there have been 1.054 miles of Metropolitan sewers built within the sewerage districts, so that there are now 125.427 miles of Metropolitan sewers. Of this total, 9.642 miles of sewers, with the Quincy Pumping Station, have been purchased from cities and towns of the districts. The

remaining 115.785 miles of sewers and other works have been constructed by the Metropolitan Boards.

The locations, lengths and sizes of these sewers are given in the following tables, together with other data referring to the public and special connections with the systems:

NORTH METROPOLITAN SEWERAGE SYSTEM

Location, Length and Sizes of Sewers, with Public and Special Connections

CITY OR TOWN	Size of Sewers	Length in Miles	Public Connections, December 31, 1929	SPECIAL CONNECTIONS	
				Character or Location of Connection	Number in Operation
Boston:					
Deer Island .	4' 0" to 9' 0"	1.653	4	-	-
East Boston	9' 0" to 1' 0"	5.467	25	Shoe factory	1
Charlestown	6' 7" x 7' 5" to 1' 0" . .	3.292	15	Middlebrook Wool-combing Co.	1
				Navy Yard	9
				Private building	1
				H. P. Hood & Sons, Inc. . . .	1
				Club House	1
Winthrop . .	9' 0"	2.864	14	Fire department station . . .	1
				Private building	1
				Bakery	1
				Rendering Works	1
				Metropolitan Water Works blow-off	1
Chelsea . . .	8' 4" x 9' 2" to 15" . . .	5.230	14	Chelsea Water Works blow-offs	2
				Naval Hospital	1
				U. S. Lighthouse Service . . .	1
				Metropolitan Water Works blow-off	1
				Cameron Appliance Co.	1
				Shultz-Goodwin Co.	1
				Andrews-Wasgatt Co.	1
				National Metallic Bed Co. . . .	1
				Linoide Co.	1
				Factory	2
Everett . . .	8' 2" x 8' 10" to 4' 8" x 5' 1" .	2.925	9	New England Structural Co. . .	1
				Beacon Oil Co.	1
				Everett Factories and Terminal Corp.	1
				-	-
				Metropolitan Water Works blow-offs	5
				Private buildings	237 ³
				Factory	1
				Bakery	1
				Swift & Co.	1
				Holy Cross Cemetery office . . .	1
Melrose . . .	4' 6" x 4' 10" to 10" . . .	6.099 ⁴	42	Private buildings	133 ⁵
				Factory	1
				Railroad station	1
				Park Department bath-house . .	1
				Harvard dormitories	2
Cambridge . .	5' 2" x 5' 9" to 1' 3" . . .	7.896	51	Slaughterhouse	1
				City Hospital	3
				Street Railway machine shop . .	1
				Private building	2
				Factory building	1
				Tannery	1
				Slaughterhouses (3)	1
				Carhouse	1
Somerville . .	6' 5" x 7' 2" to 10" . . .	3.577	16	Somerville Water Works blow-off	1
				Street railway power house . . .	1
				Stable	1
				Rendering works	1
				Railroad scale pit	1
				Private building	1

¹ The Metropolitan Sewer extends but a few feet into the town of Lexington.

² Includes 1.84 miles of sewer purchased from the city of Malden.

³ Mostly buildings connected with sewers formerly belonging to city of Malden but later purchased by the Metropolitan Sewerage Commission in accordance with Chapter 215 of the Acts of 1898 and by the Metropolitan Water and Sewerage Board in accordance with Chapter 512 of the Acts of 1911 and made parts of the North Metropolitan Sewerage System.

⁴ Includes 0.736 of a mile of sewer purchased from the city of Melrose.

⁵ Mostly buildings connected with a sewer formerly belonging to the city of Melrose but later purchased by the Metropolitan Sewerage Commission in accordance with Chapter 414 of the Acts of 1896 and with a sewer extension built in accordance with Chapter 436 of the Acts of 1897 by the Metropolitan Sewerage Commission as an outlet for part of the town of Stoneham and made parts of the North Metropolitan Sewerage System.

NORTH METROPOLITAN SEWERAGE SYSTEM—*Concluded*
Location, Length and Sizes of Sewers, with Public and Special Connections—
Concluded

CITY OR TOWN	Size of Sewers	Length in Miles	Public Con- nections, Decem- ber 31, 1929	SPECIAL CONNECTIONS	
				Character or Location of Connection	Number in Operation
Medford . .	6' 0" x 6' 3" to 10" . .	7.530	26	Armory building	1
				Private buildings	9
				Stable	1
				Police substation	1
				Tanneries	6
				Private buildings	12
				Gelatine factory	1
				Watch-hand factory	1
Winchester . .	4' 6" to 1' 3"	10.420	33	Stable	1
				Railroad station	2
				Felt works	1
				Town Hall	1
				Bay State Saw & Tool Co.	1
				Whitney Machine Co.	1
				Metropolitan Sewerage Divi- sion	1
				Water and Sewer Department	1
Stoneham . .	1' 8" to 10"	2.333	8	—	—
Woburn . .	2' 6" x 2' 7" to 1' 3" . .	1.186	3	Glue factory	4
				Private building	1
				Private buildings	274 ²
				Railroad station	1
Arlington . .	3' 0" x 3' 6" to 10" . .	5.346 ¹	62	Car house	3
				Post office	1
				Town of Arlington garage	1
				Town of Arlington workshop	1
				The Theodore Schwamb Co., Inc.	2
				Arlington Gas Light Co.	1
				Edison Transformer Station	1
				—	—
Belmont . .	1' 3" to 2' 6"	0.008	5	—	—
Wakefield . .	3' 0" to 2' 0" x 2' 3"	0.703	1	—	—
Revere . .	4' 0" to 15"	0.136	3	—	—
Reading . .	1' 4" to 3' 0"	0.055	1	—	—
		73.064 ³	368		716

¹ Includes 2.631 miles of sewer purchased from the town of Arlington.
² Mostly buildings connected with a sewer formerly belonging to the town of Arlington but later pur-
chased by the Metropolitan Sewerage Commission in accordance with Chapter 520 of the Acts of 1897 and
made a part of the North Metropolitan Sewerage System.
³ Includes 2.787 miles of Mystic Valley Sewer in Medford and Winchester, running parallel with the
Metropolitan Sewer.

SOUTH METROPOLITAN SEWERAGE SYSTEM
Location, Length and Sizes of Sewers, with Public and Special Connections

CITY OR TOWN	Size of Sewers .	Length in Miles	Public Con- nections, Decem- ber 31, 1929	SPECIAL CONNECTIONS	
				Character or Location of Connection	Number in Operation
Boston: Back Bay . .	6' 6" to 3' 9"	1.500 ¹	16	Tufts Medical School	1
				Private house	1
				Administration Building, Bos- ton Park Department	1
				Simmons College Buildings	1
				Art Museum	2
				Prince District Elementary School	1
				Private building	1
				Abattoir	3
Brighton . .	7' 0" to 12"	6.035 ²	15	Boston & Albany Railroad yard	1

¹ Includes 0.355 of a mile of sewer purchased from the city of Boston.
² Includes 0.446 of a mile of pipe and concrete sewers built for the use of the city of Boston; also
0.026 of a mile of sewer purchased from the town of Watertown.

SOUTH METROPOLITAN SEWERAGE SYSTEM—*Concluded*

Location, Length and Sizes of Sewers, with Public and Special Connections

—*Concluded*

CITY OR TOWN	Size of Sewers	Length in Miles	Public Connections, December 31, 1929	SPECIAL CONNECTIONS	
				Character or Location of Connection	Number in Operation
Dorchester	3' x 4' to 2' 6" x 2' 7"	2.870 ¹	14	Chocolate works	2
				Machine shop	1
				Paper Mill	1
				Private buildings	3
				Edison Electric Company Station	1
Hyde Park	10' 7" x 11' 7" to 4' 0" x 4' 1"	4.527	19	Mattapan Paper Mills	2
Roxbury	6' 6" x 7' to 4' 0"	1.430	—	Private buildings	2
				Fairview Cemetery buildings	1
West Roxbury	9' 3" x 10' 2" to 12"	7.643	22	—	—
				Caledonia Grove buildings	1
				Parental School	1
Brookline	6' 6" x 7' 0" to 8"	2.540 ²	14	Lutheran Evangelical Church	1
Dedham	4' x 4' 1" to 2' 9" x 3'	5.012	8	Private buildings	6
Hull ³	60" pipe	0.750	—	Private buildings	2
Milton	11' x 12' to 8"	4.081	30	Private buildings	2
Newton	4' 2" x 4' 9" to 1' 3"	2.911	11	Dedham Carpet Mills	1
				Private buildings	3
Quincy	11' 3" x 12' 6" to 24" pipe	7.392	22	Private houses	14
				Laundry	1
Waltham	3' 6" x 4' 0"	0.001	1	Metropolitan Water Works blow-off	1
				Squantum schoolhouse	1
Watertown	4' 2" x 4' 9" to 12"	0.750 ⁴	8	—	—
				Private building	1
				Factories	2
Needham	2' 0" x 2' 3" to 2' 3" x 2' 6"	4.921	1	Staley Motor Carriage Co.	1
				Knights of Pythias building	1
Wellesley ⁵	2' 0" x 2' 3"	—	1	Walker Gordon Co.	2
Canton ⁶	—	—	—	Private buildings	5
Norwood ⁶	—	—	—	—	—
Stoughton ⁶	—	—	—	—	—
Walpole ⁶	—	—	—	—	—
Braintree ⁶	—	—	—	—	—
		52.363	182	—	71

¹ Includes 1.24 miles of sewer purchased from the city of Boston.

² Includes 0.158 of a mile of pipe sewer built for the use of the town of Brookline.

³ Hull is not a part of the Metropolitan Sewerage District.

⁴ Includes 0.025 of a mile of sewer purchased from the town of Watertown.

⁵ The Metropolitan Sewer extends but a few feet into the town of Wellesley.

⁶ No Metropolitan trunk sewer has been completed to give these towns an outlet.

Information relating to areas, populations, local sewer connections and other data for the Metropolitan sewerage districts appears in the following table:

North Metropolitan Sewerage District

Area (Square Miles)	Estimated Total Population	Miles of Local Sewer Connected	Estimated Population Contributing Sewage	Ratio of Contributing Population to Total Population (Per Cent)	CONNECTIONS MADE WITH METROPOLITAN SEWERS	
					Public	Special
100.32	738,610	933.41	687,340	93.1	368	716

South Metropolitan Sewerage District

201.47	682,910	889.45	502,220	73.5	182	71
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Both Metropolitan Sewerage Districts

301.79	1,421,520	1,822.86	1,189,560	83.7	550	787
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Of the estimated gross population of 1,421,520 on December 31, 1929, 1,189,560 representing 83.7 per cent, were on that date contributing sewage to the Metropolitan sewers, through a total length of 1,822.86 miles of local sewers owned by the individual cities and towns of the districts.

These sewers are connected with the Metropolitan Systems by 550 public and 787 special connections. During the current year there has been an increase of 48.48 miles of local sewers connected with the Metropolitan Systems, and 6 public and 24 special connections have been added.

CONSTRUCTION

NORTH METROPOLITAN SEWERAGE SYSTEM

MALDEN, REVERE AND EVERETT SURFACE DRAINAGE SYSTEM

Chapter 456 of the Acts of 1924 directed the Metropolitan District Commission to construct a surface water drainage channel to improve a low area lying in the cities of Malden, Revere and Everett. Surveys and land takings were completed and work was started on construction plans and field work on July 12, 1926. A temporary injunction by the Supreme Court was placed on the further carrying on of this work, which ceased for the present on July 28, 1926, pending the decision of the Court on the question before it.

The Court has not yet rendered a decision.

NEW MYSTIC VALLEY SEWER

Chapter 184 of the Acts of 1927 authorized an extension of the New Mystic Valley main sewer, North Metropolitan Sewerage System, from its present terminus near Grove Street in Medford to Prescott Street in Medford. This work was divided into two sections, 109 and 110 of the North Metropolitan Sewerage System. Construction work has been completed and the sewer was put into operation September 20, 1929.

SOUTH METROPOLITAN SEWERAGE SYSTEM

NEW NEPONSET VALLEY SEWER

By Chapter 384 of the Acts of 1928, the Legislature increased the area of the South Metropolitan Sewerage District by the addition of the towns of Canton, Stoughton, Norwood and Walpole. To provide for the disposal of the sewage of these towns, it will be necessary to build a new main trunk line sewer in the valley of the Neponset River. This will be known as the New Neponset Valley Sewer.

Surveys and studies, including borings, have been made over a large part of the route and construction work has been started, all under the field direction of Ralph W. Loud, Assistant Civil Engineer. Contracts have been entered into for the construction of Sections 107, 108 and 109 of this trunk sewer as follows:

NEW NEPONSET VALLEY SEWER—SECTION 107

Date of contract No. 34 (Sewerage Division) August 1, 1929.

Name of contractor, V. Barletta Company.

Length of section, 3,570 feet.

Dimensions of concrete sewer, 72 inches by 75 inches.

Depth of excavation, 11 feet to 17 feet.

Assistant Engineer in immediate charge of the section, Seth Peterson.

Work was started on this section August 10, 1929, at Station 13+40 and has been carried on continuously to Station 30+0. All of this portion has been built in a fine silty sand with considerable ground water. On December 31, 1929, 1,660 feet of sewer had been completed.

NEW NEPONSET VALLEY SEWER—SECTION 108

Date of contract No. 35 (Sewerage Division), September 5, 1929.

Name of contractor, Frank W. Christy.

Length of section, 3,778 feet.

Dimensions of concrete sewer, 72 inches by 75 inches.

Depth of excavation, 9 feet to 30 feet.

Assistant Engineer in immediate charge of the section, Seth Peterson.

Work was started on this section September 16, 1929, and has been carried on continuously. From Station 1+85 to Station 10+60 this sewer has been built in a fine silty sand with a large amount of ground water. On December 31, 1929, 875 feet of sewer had been completed.

NEW NEPONSET VALLEY SEWER—SECTION 109

Date of contract No. 36 (Sewerage Division), December 5, 1929.

Name of contractor, V. Barletta Company:

Length of section, 4,450 feet.

Dimensions of concrete sewer, 72 inches by 75 inches.

Depth of excavation, 23 feet to 45 feet.

Assistant Engineer in immediate charge of the section, Seth Peterson.

The contractor has commenced work on this section, but no sewer had been completed on December 31, 1929.

NEW NEPONSET VALLEY SEWER—SECTION 110

Surveys and plans for this section are completed and the contract for its 3,180 feet of trench and tunnel will be let early in 1930.

These four sections cover the distance from Pine Tree Brook crossing of Brook Road in Milton to Paul's Bridge in Milton, a total distance of 14,978 feet.

MAINTENANCE

SCOPE OF WORK AND FORCE EMPLOYED

The maintenance of the Metropolitan Sewerage System includes the operation of 8 pumping stations, the Nut Island screen-house and 125.427 miles of Metropolitan sewers, receiving the discharge from 1,822.86 miles of town and city sewers at 1,337 points, together with the care and study of inverted siphons under streams and in the harbor.

At present the permanent maintenance force consists of 174 men, of whom 108 are employed on the North System and 66 on the South System. These are subdivided as follows: North Metropolitan System, 64 engineers and other employees in the pumping stations and 44 men, including foremen, on maintenance, care of sewer lines, buildings and grounds; South Metropolitan System, 41 engineers and other employees in the pumping stations and 25 men, including foremen, on maintenance, care of sewer lines, buildings and grounds.

The regular work of this department, in addition to the operation of the pumping stations, has consisted of routine work of cleaning and inspecting sewers and siphons, caring for tide gates, outfall sewers, regulators and overflows, measuring flow in sewers, inspection of connections to the Metropolitan sewers, and the care of pumping stations and other buildings, grounds and wharves.

In addition to these regular duties, other work has been done by the maintenance employees in this department as follows:—

EAST BOSTON PUMPING STATION

The stay-bolts in the six boilers at this station were removed and new ones were installed. This work was done by the International Engineering Works, Incorporated, of South Framingham.

The condenser pump on engine No. 3 became so badly corroded by hot salt water that it was necessary to replace it. The new pump was built and installed by the maintenance employees.

DEER ISLAND PUMPING STATION

At this station an extension was built on the locker room and new plumbing was installed in the men's wash room. This work was done by the maintenance employees.

The pile trestle which carries the 12-inch suction pipe for salt water injection was rebuilt above the pile caps and some new caps were placed. No work was done on the piles. This work was done by Buck-MacDonald Company of Boston.

CHARLESTOWN PUMPING STATION

The disc on the 36-inch check valve of pump No. 2 at this station broke and was replaced by a new one.

The condenser pump on engine No. 3 became so badly corroded by hot salt water that it was necessary to replace it. The new pump was built and installed by the maintenance employees.

The down-stream screen at this station was replaced by a new one built and installed by the maintenance employees.

NUT ISLAND SCREEN-HOUSE

In addition to the regular maintenance work at the Nut Island Screen-house and at the Hough's Neck Pumping Station, the employees of this station have made 6,446 pounds of brass castings for the different pumping stations of the Sewerage Systems. A large amount of expert machine work has been done here for other stations.

RECONSTRUCTION IN A NEW LOCATION OF PART OF SECTION C, CHARLES RIVER SEWER

The Boston and Albany Railroad, through an arrangement with the Metropolitan District Commission, moved part of Section C of the Charles River Metropolitan sewer in Brighton extending from Station 50+94.58 to Station 56+68.73 to a new location in the railroad property. This moving of the sewer was done to accommodate the location of a roundhouse for the railroad and was paid for entirely by the Boston and Albany Railroad.

GASOLENE IN PUBLIC SEWERS

During the year the usual precautions have been maintained against the introduction of gasoline into the Metropolitan sewers. An inspector who covers both North and South Metropolitan Sewerage Districts has been employed. His duties are to see that all newly constructed garages or other gasoline-using establishments are supplied with a proper gasoline separator and also to see that these separators are kept in working condition.

During the year 1929 the number of permits issued by the municipalities in the Sewerage Districts for the construction of garages and other places where gasoline is used was 654. Each of these permits necessitates an examination by our inspector. Many of them are attended to through the mails and do not require a personal visit. Visits are made, however, to all locations where a connection is to be made with the public sewerage system and to such places as do not respond to the return postal cards sent out. During the year 42 such places were connected with the sewers that empty into the Metropolitan Systems. At the present time, there are, according to our records, 1,553 garages and other establishments where gasoline is used connected with the local sewerage systems which discharge into the Metropolitan sewers.

This system of inspection has improved the gasoline situation in regard to the danger to the sewers. Occasionally odors of gasoline are detected in the sewers. These are reported to the Public Safety Department which alone has statutory control of the distribution and handling of gasoline in the Commonwealth.

NORTH METROPOLITAN SEWERAGE SYSTEM

Table showing Cities and Towns delivering Sewage to this System; Approximate Miles of Sewers connected; Estimated Populations and Areas now contributing; Total Areas ultimately to contribute, and Present Populations on Such Areas; Ratios of Present Contributing Areas to Ultimate Areas, and Ratios of Populations now contributing to Present Total Populations.

[Populations estimated as of December 31, 1929]

CITIES AND TOWNS	Miles of Local Sewers Connected	Separate or Combined	Number of Connections with Local Sewers	Estimated Number of Persons Served by Each House Connection ¹	Estimated Population Now Contributing Sewage	Estimated Present Total Population	Estimated Area Now Contributing Sewage	Area Ultimately to Contribute to Sewage	Ratio of Contributing Population to Present Total Population	Ratio of Contributing Area to Ultimate Area
							Sq. Miles	Sq. Miles	Per Cent.	Per Cent.
Boston (Deer Island)	0.70	Separate	3,732	4.7	820 ²	820	1.41	1.61	98.4	87.6
Winthrop	33.21	Separate	5,447	11.75	17,540	17,820	1.20	2.18	96.1	55.0
Boston (East Boston)	34.67	Separate and combined	4,810	10.2	64,000	66,570	1.20	2.24	98.6	53.6
Chelsea	32.66	Separate and combined	6,540	6.5	49,080	49,740	2.14	3.34	98.0	64.1
Everett	53.31	Separate and combined	9,174	5.65	42,510	43,360	3.37	5.07	96.4	66.5
Malden	75.91	Separate	4,746	4.4	51,830	53,790	2.19	3.73	95.6	58.7
Melrose	48.16	Separate	5,581	6.95	20,880	21,830	0.67	1.27	99.2	52.8
Boston (Charlestown)	21.82	Separate and combined	18,830	6.8	38,790	39,100	5.17	6.11	99.2	84.6
Cambridge	164.34	Separate and combined	17,833	5.75	128,040	129,010	3.66	3.96	98.2	92.4
Somerville	106.25	Separate and combined	9,744	5.45	102,540	104,430	4.09	8.35	97.8	49.0
Medford	86.69	Separate	2,722	4.50	53,100	54,300	1.95	5.95	98.7	32.8
Winchester	41.16	Separate	1,660	5.6	12,250	12,410	1.11	12.71	47.9	8.7
Woburn	20.54	Separate	1,407	4.5	9,300	19,400	0.96	5.50	63.9	17.5
Stonham	18.24	Separate	5,338	4.75	6,330	9,910	2.61	5.20	87.2	50.2
Arlington	53.08	Separate	3,050	5.4	25,360	29,070	1.90	4.66	94.0	40.8
Belmont	41.43	Separate	1,501	5.0	17,100 ³	18,200	1.01	7.65	45.0	13.2
Wakefield	23.90	Separate	592	3.8	7,500	16,650	0.62	5.11	40.0	12.1
Lexington	14.91	Separate	5,192	6.8	35,310	36,920	2.47	5.86	95.6	42.2
Revere	52.28	Separate	675	4.2	2,830	9,650	0.49	9.82	29.3	5.0
Reading	10.15	Separate	108,574	6.33	687,340	738,610	38.32	100.32	93.1	38.1
Totals	933.41	-	-	-	-	-	-	-	-	-

¹ Estimated from Assessors' statement of the number of houses in each city or town on April 1, 1929, and the population from census of 1925.

² Estimated by Superintendent of the Institution on Deer Island.

³ Including 2 connections with McLean Hospital, having an estimated population of 626.

Table showing Cities and Towns delivering Sewage to this System; Approximate Miles of Sewers connected; Estimated Populations and Areas now contributing; Total Areas ultimately to contribute, and Present Populations on Such Areas; Ratios of Present Contributing Areas to Ultimate Areas, and Ratios of Populations now contributing to Present Total Populations.

[Populations estimated as of December 31, 1929]

CITIES AND TOWNS	Miles of Local Sewers Connected	Separate or Combined	Number of Connections with Local Sewers	Estimated Number of Persons Served by Each House Connection ¹	Estimated Population Now Contributing Sewage	Estimated Present Total Population	Estimated Area Now Contributing Sewage	Area Ultimately to Contribute to Sewage	Ratio of Contributing Population to Present Total Population	Ratio of Contributing Area to Ultimate Area
							Sq. Miles	Sq. Miles	Per Cent.	Per Cent.
Boston (Back Bay)	27.80	Separate and combined	2,223	20.0	44,460	44,670	1.17	1.61	99.5	72.7
Boston (Brighton)	71.95	Separate and combined	5,862	9.95	58,330	58,600	3.34	3.74	99.5	89.3
Brookline	88.09	Separate and combined	6,830	6.8	46,440	46,590	4.02	6.81	99.7	59.0
Newton	172.96	Separate	11,994	4.85	58,170	59,330	9.05	16.88	98.0	53.6
Watertown	63.03	Separate	5,424	5.2	28,200	28,670	2.75	4.04	98.4	68.1
Waltham	54.45	Separate	4,925	7.3	35,950	36,790	2.76	13.63	97.7	20.2
Boston (Dorchester)	70.69	Separate and combined	8,106	9.3	75,390 ²	104,050 ²	2.90	4.89	72.5	59.3
Milton	28.40	Separate and combined	2,178	4.2	9,150 ²	14,800 ²	1.29	12.59	61.8	10.2
Boston (Hyde Park)	40.87	Separate	3,276	6.55	21,460	21,560	1.86	4.57	99.5	40.7
Dedham	21.39	Separate	1,339	4.9	6,560	14,600 ³	1.04	9.40	44.9	11.1
Boston (Roxbury) ⁴	—	—	—	—	52,280 ²	52,280 ²	—	1.23	—	—
Boston (West Roxbury)	81.89	Separate and combined	6,915	6.0	44,180 ^{2,5}	59,100 ²	3.48	8.92	74.8	39.0
Quincy	125.23	Separate	11,751	5.75	67,570	69,070	4.85	12.56	97.8	38.6
Wellesley	31.46	Separate	1,273	4.0	5,090	9,920	1.81	9.89	51.3	18.3
Needham	11.24	Separate	309	4.1	1,270	9,910	0.54	12.50	12.8	4.3
Canton ⁶	—	—	—	—	—	5,900	—	17.84	—	—
Norwood ⁶	—	—	—	—	—	15,690	—	10.16	—	—
Stoughton ⁶	—	—	—	—	—	8,890	—	16.23	—	—
Walpole ⁶	—	—	—	—	—	7,660	—	20.54	—	—
Brantree ⁶	—	—	—	—	—	14,830	—	13.44	—	—
Totals	889.45	—	72,405	6.94	502,220	682,910	40.86	201.47	73.5	20.3

¹ Estimated from Assessors' statement of the number of houses in each city or town on April 1, 1929, and the population from census of 1925.

² Parts of Dorchester, Milton, Roxbury and West Roxbury which are situated within the South Metropolitan Sewerage System limits are tributary at present to Boston main drainage works.

³ Part of town not included in Metropolitan Sewerage District.

⁴ At present connected with Boston main drainage system.

⁵ Including connection with institution at Austin Farm, having an estimated population of 2,689.

⁶ No Metropolitan trunk sewer has been completed to give these towns an outlet.

BOTH METROPOLITAN SEWERAGE SYSTEMS
Table showing Areas delivering Sewage to both Systems; Approximate Miles of Sewers connected; Estimated Populations and Areas now contributing; Total Areas ultimately to contribute, and Present Populations on Such Areas. Ratios of Present Contributing Areas to Ultimate Areas, and Ratios of Populations now contributing to Present Total Populations.

[Population estimated as of December 31, 1929]

SYSTEMS	Miles of Local Sewers Connected	Separate or Combined	Number of Connections with Local Sewers	Estimated Number of Persons Served by Each House Connection	Estimated Population Now Contributing Sewage	Estimated Present Total Population	Estimated Area Now Contributing Sewage	Area Ultimately to Contribute to Sewage	Ratio of Contributing Population to Present Total Population	Ratio of Contributing Area to Ultimate Area
North Metropolitan	933.41	Separate and combined	108,574	6.33	687,340	738,610	Sq. Miles 38.22	Sq. Miles 100.32	Per Cent. 93.1	Per Cent. 38.1
South Metropolitan	889.45	Separate and combined	72,405	6.94	502,220	682,910	40.86	201.47	73.5	20.3
Totals	1,822.86	- - -	180,979	6.57	1,189,560	1,421,520	79.08	301.79	83.7	26.2

PUMPING STATIONS

CAPACITIES AND RESULTS NORTH METROPOLITAN SYSTEM

Deer Island Pumping Station

At this station are four submerged centrifugal pumps with impeller wheels 8.25 feet in diameter, driven by triple-expansion engines of the Reynolds-Corliss type.

Contract capacity of 1 pump: 100,000,000 gallons, with 19-foot lift.

Contract capacity of 3 pumps: 45,000,000 gallons each, with 19-foot lift.

Average coal duty for the year: 63,600,000 foot pounds.

Average quantity raised each day: 84,700,000 gallons.

Maximum quantity raised per day: 151,600,000 gallons.

East Boston Pumping Station

At this station are four submerged centrifugal pumps, with impeller wheels 8.25 feet in diameter, driven by triple-expansion engines of the Reynolds-Corliss type.

Contract capacity of 1 pump: 100,000,000 gallons with 19-foot lift.

Contract capacity of 3 pumps: 45,000,000 gallons each, with 19-foot lift.

Average coal duty for the year: 72,100,000 foot pounds.

Average quantity raised each day: 82,700,000 gallons.

Maximum quantity raised per day: 149,600,000 gallons.

Charlestown Pumping Station

At this station are three submerged centrifugal pumps, two of them having impeller wheels 7.5 feet in diameter, the other 8.25 feet in diameter. They are driven by triple-expansion engines of the Reynolds-Corliss type.

Contract capacity of 1 pump: 60,000,000 gallons with 8-foot lift.

Contract capacity of 2 pumps: 22,000,000 gallons each, with 11-foot lift.

Average coal duty for the year: 50,300,000 foot pounds.

Average quantity raised each day: 43,300,000 gallons.

Maximum quantity raised per day: 72,100,000 gallons.

Alewife Brook Pumping Station

The pumping units in this station consist of one Andrews pump driven by a compound marine engine, one Morris pump and Morris compound engine and a specially designed engine of vertical cross-compound type having between the cylinders a centrifugal pump rotating on a horizontal axis.

Contract capacity of the Andrews pump: 4,500,000 gallons with 13-foot lift.

Contract capacity of Morris pump: 8,000,000 gallons with 15-foot lift.

Contract capacity of the special pump: 13,000,000 gallons with 13-foot lift.

Average coal duty for the year: 20,700,000 foot pounds.

Average quantity raised each day: 6,730,000 gallons.

Maximum quantity raised per day: 13,300,000 gallons.

Reading Pumping Station

At this station are two submerged centrifugal pumps, one of 2,500,000 gallons per 24 hours, and one of 4,000,000 gallons per 24 hours, capacity. These operate against a maximum head of 65 feet, and are actuated by vertical shafts directly connected with 75 and 100 horse-power motors. Alternating current of 440 volts furnished by the town of Reading is used.

Average quantity pumped per 24 hours: 870,000 gallons.

Maximum quantity raised per day: 2,720,000 gallons.

SOUTH METROPOLITAN SYSTEM

Ward Street Pumping Station

At this station are two vertical, triple-expansion pumping engines, of the Allis-Chalmers type, operating reciprocating pumps, the plungers of which

P.D. 4839

are 48 inches in diameter with a 60-inch stroke and one 50,000,000-gallon centrifugal pumping unit actuated by a 500 H.P. Uniflow engine.

Contract capacity of 3 pumps: 50,000,000 gallons each, with 45-foot lift.
Average coal duty for the year: 80,400,000 foot pounds.
Average quantity raised each day: 36,500,000 gallons.
Maximum quantity raised per day: 58,000,000 gallons.

Quincy Pumping Station

The plant at this station consists of one compound condensing Deane duplex piston pumping unit and one Lawrence centrifugal pump driven by a Sturtevant compound condensing engine and one Morris centrifugal pump driven by a Morris compound condensing engine.

Contract capacity of 3 pumps: Morris centrifugal, 10,000,000 gallons; Deane, 5,000,000 gallons; Lawrence centrifugal, 10,000,000 gallons.
Average coal duty for the year: 32,300,000 foot pounds.
Average quantity raised each day: 7,200,000 gallons.
Maximum quantity raised per day: 25,500,000 gallons.

Nut Island Screen-house

The plant at this house includes two sets of screens in duplicate actuated by small reversing engines of the Fitchburg type. Two vertical Deane boilers, 80 horse-power each, operate the engines, provide heat and light for the house, burn materials intercepted at the screens, and furnish power for the Hough's Neck pumping station.

Average daily quantity of sewage passing screens: 64,400,000 gallons.
Maximum quantity passing screens per day: 199,000,000 gallons.

Hough's Neck Pumping Station

At this station are two 6-inch submerged Lawrence centrifugal pumps with vertical shafts actuated by two Sturtevant direct-current motors.
The labor and electric energy for this station are supplied from the Nut Island Screen-house, and as used at present it does not materially increase the amount of coal used at the latter station.

Average quantity raised each day: 243,000 gallons.
Maximum quantity raised per day: 499,000 gallons.

Average Daily Volume of Sewage lifted at Each of the Eight Metropolitan Sewerage Pumping Stations during the Year, as compared with the Corresponding Volumes for the Previous Year

PUMPING STATION	AVERAGE DAILY PUMPAGE			
	Jan. 1, 1929, to Dec. 31, 1929	Jan. 1, 1928, to Dec. 31, 1928	Increase during the Year	
	Gallons	Gallons	Gallons	Per Cent
Deer Island	84,700,000	86,900,000	2,200,000 ¹	2.5 ¹
East Boston	82,700,000	84,900,000	2,200,000 ¹	2.6 ¹
Charlestown	43,300,000	42,900,000	400,000	0.9
Alewife Brook	6,730,000	6,440,000	290,000	4.5
Reading	870,000	992,000	122,000 ¹	12.3 ¹
Quincy	7,200,000	6,787,000	413,000	6.1
Ward Street (actual gallons pumped)	36,500,000	37,700,000	1,200,000 ¹	3.2 ¹
Hough's Neck	243,000	244,000	1,000 ¹	0.4 ¹

¹ Decrease.

METROPOLITAN SEWERAGE OUTFALLS

The Metropolitan Sewerage Districts now have outfalls in Boston Harbor at five points, two of which may discharge sewage from the North District and three from the South District.

During the year the sewage of the North District has been discharged wholly through the outlet located near Deer Island light. The other outfall of this system is closed by a cast-iron cover which can easily be removed.

Of the outfalls of the South District, two extend for a distance exceeding one mile from the shore of Nut Island, Quincy, and the third one, called an emergency outlet, extends about 1,500 feet from the same. It was necessary to discharge sewage through this outfall seventy-eight hours during the year.

During the year the average flow through the North Metropolitan District outfall at Deer Island has been 84,700,000 gallons of sewage per 24 hours, with a maximum rate of 151,600,000 gallons during a stormy period in April, 1929. The amount of sewage discharged into the North Metropolitan District averaged 123 gallons per day for each person, taking the estimated population of the District contributing sewage. If the sewers in this District were restricted to the admission of sewage proper only, this per capita amount would be considerably decreased.

In the South Metropolitan District an average of 64,400,000 gallons of sewage per 24 hours has passed through the screens at the Nut Island Screen-house and has been discharged from the outfalls into the outer harbor. The maximum rate of discharge per day which occurred during a stormy period in April, 1929, was 199,000,000 gallons. The discharge of sewage through these outfalls represents the amount of sewage contributed by the South Metropolitan District, which was at the rate of 128 gallons per day per person of the estimated number contributing sewage in the District.

The daily discharge of sewage per capita is larger in the South District than it is in the North District because, owing to the large size and unused capacity of the South District High-level Sewer, more storm water is at present admitted to the sewers of this District.

MATERIAL INTERCEPTED AT THE SCREENS

The material removed from the sewage at the screens of the North Metropolitan Sewerage Stations, consisting of rags, paper and other floating materials, has during the year amounted to 1,969 cubic yards. This is equivalent to 1.72 cubic feet for each million gallons of sewage pumped at Deer Island.

The material removed from the sewage at the screens of the South Metropolitan Sewerage Stations amounted to 4,364 cubic yards, equal to 5.01 cubic feet per million gallons of sewage delivered at the outfall works at Nut Island.

Studies of sewage flows in the Metropolitan sewers and siphons indicate that they are free from deposit.

FREDERICK D. SMITH,

Director and Chief Engineer of Sewerage Division.

Boston, January 1, 1930.

FINANCIAL STATEMENT
OF THE
METROPOLITAN DISTRICT COMMISSION
FOR THE YEAR ENDING NOVEMBER 30, 1929

GENERAL

HEADQUARTERS BUILDING CONSTRUCTION FUND

Chapter 362, Acts of 1929	\$750,000 00
<i>Expenditures</i>	
Advertising	7 20
Balance, Dec. 1, 1929	<u>\$749,992 80</u>

PARKS DIVISION

Construction

METROPOLITAN PARKS CONSTRUCTION FUND

Total amount authorized to Dec. 1, 1928	\$9,093,043 96
Receipts added before June 1, 1901	198,942 81
	<u>\$9,291,986 77</u>
<i>Expenditures</i>	
Amounts charged to Dec. 1, 1929	9,263,603 93
Balance, Dec. 1, 1929	<u>\$28,382 84</u>

METROPOLITAN PARKS CONSTRUCTION FUND, SERIES II

Total amount authorized to Dec. 1, 1928	\$9,613,749 63
Receipts from sales, etc.	29,934 16
	<u>\$9,643,683 79</u>

<i>Expenditures</i>	
Stony Brook Reservation: (Roadway connection between Turtle Pond Road and West Boundary Road)	
Construction:	
Labor and materials	\$337 92
Engineering:	
Services	\$209 20
Expenses	3 50
	<u>212 70</u>
	\$550 62
Middlesex Fells Parkway:	
Land	4 00
Mystic Valley Parkway:	
Legal:	
Services	47 29
Revere Beach Parkway:	
Legal:	
Services	\$28 98
Expenses	3 20
	<u>32 18</u>
Quannapowitt Parkway:	
Construction:	
Labor and materials	\$3,429 34
Engineering:	
Services	\$88 60
Expenses	10 48
	<u>99 08</u>
	3,528 42
Dedham Parkway:	
Land	\$192 00
Legal:	
Services	15 13
	<u>207 13</u>

Metropolitan Parks Construction Fund, Series II—Concluded

Neponset Bridge:		
Interest		\$23 02
Street or Way in Brookline:		
Construction:		
Contract, University Excavating Co.	\$39,835 85	
Labor and materials	237 85	
		\$40,073 70
Land		86,462 48
Engineering:		
Services	\$4,448 22	
Expenses	417 44	
		4,865 66
Legal:		
Services	\$83 71	
Expenses	6 65	
		90 36
Advertising bids		68 55
		131,560 75
		\$135,953 41
		9,430,765 69
Amounts charged to Dec. 1, 1928		\$9,566,719 10
Balance, Dec. 1, 1929		\$76,964 69

CHARLES RIVER BASIN CONSTRUCTION FUND

Total amount authorized to Dec. 1, 1928	\$4,500,000 00
Receipts to Dec. 1, 1928	9,368 91
	\$4,509,368 91
<i>Expenditures</i>	
Amounts charged to Dec. 1, 1929	4,472,922 22
Balance, Dec. 1, 1929	\$36,446 69

NANTASKET BEACH CONSTRUCTION FUND

Total amount authorized to Dec. 1, 1928	\$700,000 00
Receipts to Dec. 1, 1928	5,881 50
	\$705,881 50
<i>Expenditures</i>	
Amounts charged to Dec. 1, 1929	705,881 50

NORTH BEACON STREET BRIDGE CONSTRUCTION FUND

Total amount authorized to Dec. 1, 1928	\$175,000 00
<i>Expenditures</i>	
Amounts charged to Dec. 1, 1929	175,000 00

MASSACHUSETTS AVENUE BRIDGE CONSTRUCTION FUND

Total amount authorized to Dec. 1, 1928	\$600,000 00
<i>Expenditures</i>	
Amounts charged to Dec. 1, 1929	522,297 25
Balance, Dec. 1, 1929	\$77,702 75

NORTHERN TRAFFIC ROUTE CONSTRUCTION FUND

Total amount authorized to Dec. 1, 1928	\$2,950,000 00
Chapter 386, Acts of 1929	50,000 00
	\$3,000,000 00
<i>Expenditures</i>	
Land	\$14,675 00
Engineering:	
Services	\$140 60
Expenses	35
	140 95
Legal:	
Services	\$112 33
Expenses	56 55
	168 88
Other services and expenses:	
(Betterment assessments)	164 00
Apportionment Commission	1,638 68
Interest	89,545 52
	\$106,333 03
	2,780,528 83
Amounts charged to Dec. 1, 1928	2,886,861 86
Balance, Dec. 1, 1929	\$113,138 14

Receipts:							
For the year ending Nov. 30, 1929	.	.	.	.	.	.	\$1,219 04
For the period prior to Dec. 1, 1928	.	.	.	.	.	.	120,949 52
							\$122,168 56
Expenditures:							
For the year ending Nov. 30, 1929	.	.	.	.	.	.	106,510 06
							\$15,658 50
Balance, Dec. 1, 1929	.	.	.	.	.	.	

Total amount authorized to Dec. 1, 1928	\$1,550,000 00
Chapter 227, Acts of 1929	300,000 00
	\$1,850,000 00

Construction:						
Contracts:						
T. Stuart & Son Co.	.	.	.	\$115,469	56	
Thomas J. McCue	.	.	.	8,131	98	
Bay State Dredging Co.	.	.	.	2,650	00	
						\$126,251 54
Labor and materials	.	.	.			297 75
Land	.	.	.	.	.	14,000 00
Engineering:						
Services	.	.	.	.	.	\$597 40
Expenses	.	.	.	.	.	7 01
						604 41
Legal:						
Services	.	.	.	.	.	\$137 74
Expenses	.	.	.	.	.	16 29
						154 03
Architects:						
Services	.	.	.	.	.	27 82
Advertising	.	.	.	.	.	226 20
Temporary lighting	.	.	.	.	.	200 19
Apportionment Commission	.	.	.	.	.	12,307 50
Relocating of bridge	.	.	.	.	.	1,616 22
Traffic counts	.	.	.	.	.	1,227 79
Interest	.	.	.	.	.	68,803 84
						\$225,717 29
Amounts charged to Dec. 1, 1928	.	.	.	.	.	1,534,344 99
						1,760,062 28
Balance, Dec. 1, 1929	.	.	.	.	.	\$89,937 72

Total amount authorized to Dec. 1, 1928	\$200,000 00
<i>Expenditures</i>	
Amounts charged to Dec. 1, 1929	192,929 16
Balance, Dec. 1, 1929	\$7,070 84

Total amount authorized to Dec. 1, 1928	\$325,000 00
<i>Expenditures</i>	
Amounts charged to Dec. 1, 1929	305,186 35
Balance, Dec. 1, 1929	<u>\$19,813 65</u>

Total amount authorized to Dec. 1, 1928	\$310,000 00
<i>Expenditures</i>	
Amounts charged to Dec. 1, 1929	304,685 17
Balance, Dec. 1, 1929	\$5,314 83

Total amount authorized to Dec. 1, 1928	\$50,000 00
Receipts:	
For the year ending Nov. 30, 1929	\$297 41
For the period prior to Dec. 1, 1928	1,232 03
	1,529 44
	\$51,529 44

Metropolitan Parks Expense Fund—Continued

Expenditures, Dec. 1, 1928, to Dec. 1, 1929:

General Expense:		
Advertising	\$3 50	
Shrubs	452 52	
Freight	60	
Newsboy badges	12 25	
Discount on securities	250 00	
		\$718 87
Police:		
Damages to motorcycles and traffic signal.		446 20
Engineering:		
Refunds on account of bids		10 00
Blue Hills Reservation:		
Legal:		
Expense	\$6 67	
Land	111 86	
Repairs to houses	3,713 08	
Bath house expenses	41 41	
		3,873 02
Quincy Shore Reservation:		
Sidewalk and entrance construction:		
Cost	\$723 00	
Refund	53 92	
		776 92
Spring Street, Dedham:		
Advertising bids		104 50
Blue Hills Parkway:		
Legal:		
Services	\$12 84	
Sidewalk and entrance construction:		
Cost	95 64	
		108 48
Furnace Brook Parkway:		
Sidewalk and entrance construction:		
Cost		63 01
Middlesex Fells Reservation:		
Advertising bids	\$61 50	
Repairs to houses	736 49	
Shrubs	1,049 52	
Sidewalk and entrance construction:		
Cost	19 24	
		1,866 75
Middlesex Fells Parkway:		
Sidewalk and entrance construction:		
Cost		3,457 91
Mystic Valley Parkway:		
Filling materials	\$803 00	
Damage to lamp pole	14 95	
Sidewalk and entrance construction:		
Cost	588 83	
		1,406 78
Lynn Fells Parkway:		
Sidewalk and entrance construction:		
Cost	\$123 39	
Refund	189 87	
		313 26
Alewife Brook Parkway:		
Legal:		
Services	\$14 54	
Sidewalk and entrance construction:		
Cost	99 09	
		113 63
Middlesex Fells Roads:		
Sidewalk and entrance construction:		
Cost		419 86
Woburn Parkway:		
Sidewalk and entrance construction:		
Cost		92 70
Revere Beach Reservation:		
Bath House:		
Payrolls	\$30,040 45	
Miscellaneous supplies and expenses	14,460 26	
		\$44,500 71
Advertising bids	7 00	
Damage to lamp	184 07	
Sidewalk and entrance construction:		
Cost	95 47	
		44,787 25
Revere Beach Parkway:		
Sidewalk and entrance construction:		
Cost	\$546 01	
Damages	6 32	
		552 33

Metropolitan Parks Expense Fund — Concluded

Nahant Beach Parkway:			
Bath House:			
Payrolls		\$9,453 86	
Miscellaneous supplies and expenses		4,900 23	
			\$14,354 09
Charles River Upper Division:			
Cultivating marsh land, Nonantum Road		\$2,097 52	
Widening Brooks Street, Brighton		55 86	
Construction of wall		1,881 73	
Repairs to house		39 20	
Replacing lamp post		84 18	
			4,158 49
Riverside Recreation Grounds:			
Golf course construction		\$18,053 85	
Wiring dance hall, etc.		77 25	
			18,131 10
Charles River Lower Basin:			
Erection of band stand		\$3,088 35	
Magazine Beach Bath House:			
Payrolls	\$2,748 88		
Miscellaneous supplies and expenses	1,800 86		
		4,549 74	
			7,638 09
Fresh Pond Parkway:			
Sidewalk and entrance construction:			
Cost			125 00
Cambridge Parkway:			
Sidewalk and entrance construction:			
Cost	\$1,981 88		
Refund	25 08		
		\$2,006 96	
Payrolls		193 20	
			2,200 16
Nantasket Beach Reservation:			
Bath House:			
Payrolls	\$15,870 03		
Miscellaneous supplies and expenses	4,595 01		
		\$20,465 04	
Repairs to buildings		7,978 29	
			28,443 33
Wellington Bridge:			
Repairs			859 20
Revere Beach Improvements:			
(Chap. 138, Acts of 1927)			
Construction:			
Labor and materials			40 25
		\$135,061 18	
Expenditures, prior to Dec. 1, 1928		3,079,084 97	
			\$3,214,146 15
Balance, Dec. 1, 1929			\$280,954 42

METROPOLITAN PARKS TRUST FUND

Receipts:			
For the year ending Nov. 30, 1929		\$116 72	
For the period prior to Dec. 1, 1928		41,107 06	
			\$41,223 78
Expenditures:			
For the year ending Nov. 30, 1929		—	
For the period prior to Dec. 1, 1928		\$38,106 50	
			38,106 50
Balance, Dec. 1, 1929			\$3,117 28

EDWIN U. CURTIS MEMORIAL TRUST FUND

Receipts:			
For the year ending Nov. 30, 1929		\$45 05	
For the period prior to Dec. 1, 1928		1,501 84	
			\$1,546 89
No expenditures			
			—
Balance, Dec. 1, 1929			\$1,546 89

JOHN W. WEEKS BRIDGE TRUST FUND

Receipts:			
For the year ending Nov. 30, 1929		\$9 22	
For the period prior to Dec. 1, 1928		235,595 20	
			\$235,604 42
Expenditures:			
For the year ending Nov. 30, 1929		—	
For the period prior to Dec. 1, 1928		\$235,287 90	
			235,287 90
Balance, Dec. 1, 1929			\$316 52

GENERAL REVENUE, BUNKER HILL MONUMENT

Receipts:			
For the year ending Nov. 30, 1929		\$4,384 60	
For the period prior to Dec. 1, 1928		30,533 70	
			\$34,918 30

Maintenance

METROPOLITAN PARKS MAINTENANCE FUND, GENERAL

Appropriation (Chapter 146, Acts of 1929)	\$822,050 00
Balance brought forward from 1928 appropriation to cover 1928 expenditures on 1929 books	40,419 81
	<u>\$862,469 81</u>

		<i>Expenditures</i>	
Administration and Engineering:			
Police		\$248,269 43	
Salaries:			
Commissioners	\$2,500 00		
Secretary, clerks, etc.	10,617 76		
Chief engineer and assistants	29,788 87		
		<u>42,906 63</u>	
Rent, care and lighting of building		2,323 86	
Stationery, office supplies and expenses		3,089 05	
Printing		196 87	
Engineering supplies and expenses:			
General	\$2,284 90		
Auto expenses	1,010 73		
		<u>3,295 63</u>	
Pensions and annuities		25,822 15	
Retirement payments		5,107 72	
		<u>\$331,011 34</u>	
Blue Hills Reservation:			
Labor and teaming:			
General	\$72,816 03		
Moth work	13,981 19		
Road repairs	2,221 31		
		<u>\$89,018 53</u>	
Supplies and miscellaneous expenses:			
General	\$18,236 17		
Moth work	2,922 59		
Road repairs	2,486 31		
		<u>23,645 07</u>	
Lighting		75 19	
		<u>112,738 79</u>	
Stony Brook Reservation:			
Labor and teaming:			
General	\$2,091 19		
Moth work	5,173 37		
Road repairs	346 06		
		<u>\$7,610 62</u>	
Supplies and miscellaneous expenses:			
General	\$1,634 18		
Moth work	433 97		
Road repairs	886 25		
		<u>2,954 40</u>	
		<u>10,565 02</u>	
Neponset River Reservation:			
Labor and teaming:			
General	\$114 00		
Moth work	370 50		
		<u>\$484 50</u>	
Supplies and miscellaneous expenses:			
General	\$166 63		
Moth work	133 36		
		<u>299 99</u>	
		<u>784 49</u>	
Quincy Shore Reservation:			
Labor and teaming:			
General	\$6,402 99		
Moth work	19 25		
		<u>\$6,422 24</u>	
Street lighting		3,026 05	
Supplies and miscellaneous expenses:			
General		2,320 14	
		<u>11,768 43</u>	
Middlesex Fells Reservation:			
Labor and teaming:			
General	\$49,973 81		
Moth work	26,494 06		
Road repairs	6,240 94		
		<u>\$82,708 81</u>	
Supplies and miscellaneous expenses:			
General	\$24,218 57		
Moth work	1,523 48		
Road repairs	1,470 60		
		<u>27,212 65</u>	
		<u>109,921 46</u>	
Mystic River Reservation:			
Labor and teaming:			
General	\$12,406 36		
Supplies and miscellaneous expenses:			
General		2,359 45	
		<u>14,765 81</u>	

Metropolitan Parks Maintenance Fund, General — Concluded

Revere Beach Reservation:			
Labor and teaming:			
General	\$48,295 69		
Road repairs	45 69		
		\$48,341 38	
Street lighting		8,261 66	
Supplies and miscellaneous expenses:			
General	\$15,668 62		
Road repairs	217 75		
		15,886 37	
Repairs and renewals		341 09	
			\$72,830 50
Lynn Shore Reservation:			
Labor and teaming:			
General	\$7,212 53		
Road repairs	285 58		
		\$7,498 11	
Street lighting		2,850 00	
Supplies and miscellaneous expenses:			
General	\$3,349 78		
Road repairs	456 57		
		3,806 35	
			14,154 46
Winthrop Shore Reservation:			
Labor and teaming:			
General	\$3,052 25		
Road repairs	246 91		
		\$3,299 16	
Street lighting		665 28	
Supplies and miscellaneous expenses:			
General	\$1,378 35		
Road repairs	74 19		
		1,452 54	
			5,416 98
Charles River Upper Division:			
Labor and teaming:			
General	\$42,606 28		
Moth work	4,017 14		
Road repairs	1,355 66		
		\$47,979 08	
Street lighting		2,596 50	
Supplies and miscellaneous expenses:			
General	\$23,947 31		
Moth work	197 88		
Road repairs	2,811 58		
		26,956 77	
Repairs and renewals		560 63	
			78,092 98
Riverside Recreation Grounds:			
Labor and teaming:			
General		\$5,980 71	
Supplies and miscellaneous expenses:			
General		3,114 51	
Repairs and renewals		75 77	
			9,170 99
Beaver Brook Reservation:			
Labor and teaming:			
General	\$2,905 55		
Moth work	586 00		
		\$3,491 55	
Supplies and miscellaneous expenses:			
General		1,270 32	
Repairs and renewals		21 56	
			4,783 43
Cambridge Parkway:			
Labor and teaming:			
General	\$33,217 91		
Moth work	337 68		
Road repairs	451 50		
		\$34,007 09	
Street lighting		11,005 28	
Supplies and miscellaneous expenses:			
General	\$22,997 61		
Moth work	10 78		
Road repairs	1,227 58		
		24,235 97	
Repairs and renewals		367 62	
			69,615 96
John W. Weeks Bridge:			
Labor and teaming:			
General		\$567 75	
Street lighting		505 68	
Supplies and miscellaneous expenses:			
General		130 34	
			1,203 77
Balance, Dec. 1, 1929			\$846,824 41
			\$15,645 40

METROPOLITAN PARKS MAINTENANCE FUND, SPECIALS

BAND CONCERTS		
Appropriation (Chapter 146, Acts of 1929)		\$20,000 00
Expenditures		
Advertising		\$53 05
Bands:		
Blue Hills Division	\$1,400 00	
Middlesex Fells Division	2,250 00	
Revere Beach Division	3,948 40	
Charles River Upper Division	2,847 65	
Nantasket Beach Division	9,232 50	
Bunker Hill	150 00	
		19,828 55
		19,881 60
Balance, Dec. 1, 1929		\$118 40
CERTAIN LANDS, MYSTIC LAKES		
Appropriation (Chapter 398, Acts of 1926. Time extended to May 29, 1930, by Chapter 51, Resolves of 1928)		\$25,000 00
Expended to Dec. 1, 1929		100 00
		24,900 00
Balance, Dec. 1, 1929		
PARKING SPACES, NAHANT BEACH		
Appropriation (Chapter 343, Acts of 1927)		\$8,000 00
Expended to Dec. 1, 1929		7,904 22
		\$95 78
Balance, Dec. 1, 1929		
DEVELOPMENT OF CERTAIN LAND IN DEDHAM		
Appropriation (Chapter 146, Acts of 1929)		\$25,000 00
Expenditures		
Filling material		\$16,015 17
Engineering:		
Services	\$503 20	
Expenses	51 85	
		555 05
		16,570 22
Balance, Dec. 1, 1929		\$8,429 78
LAND FOR RESERVATION, CHARLES RIVER, DEDHAM		
Appropriation (Chapter 343, Acts of 1927)		\$75,000 00
Expended to Dec. 1, 1929		70,395 92
		\$4,604 08
Balance, Dec. 1, 1929		
BORDER ROADS		
Appropriation (Chapter 405, Acts of 1928)		\$10,000 00
No expenditures		
		\$10,000 00
Balance, Dec. 1, 1929		
LYNN SHORE PROTECTION		
Appropriation (Chapter 386, Acts of 1929)		\$10,000 00
Expenditures		
Construction:		
Contract, Leo J. Nawn, Inc.		\$9,092 08
Engineering:		
Services	\$475 87	
Expenses	22 25	
		498 12
		9,590 20
Balance, Dec. 1, 1929		\$409 80

METROPOLITAN PARKS MAINTENANCE FUND, BOULEVARDS, GENERAL

Appropriation (Chapter 146, Acts of 1929)		\$475,200 00
Balance brought forward from 1928 appropriation to cover 1928 expenditures on 1929 books		31,492 52
		\$506,692 52
Expenditures		
Administration and Engineering:		
Police		\$102,476 24
Salaries:		
Commissioners	\$2,500 00	
Secretary, clerks, etc.	10,617 75	
Chief Engineer and assistants	28,652 70	
		41,770 45
Rent, care and lighting of building		2,462 72
Stationery, office supplies and expenses		3,157 19
Printing		196 85
Engineering supplies and expenses:		
General	\$2,297 55	
Automobile expenses	1,196 71	
		3,494 26
Retirement payments		788 36
		\$154,346 07

Metropolitan Parks Maintenance Fund, Boulevards, General — Continued

Blue Hills Parkway:			
Labor and teaming:			
General	\$6,551	87	
Moth work	75	05	
			\$6,626 92
Street lighting			3,907 34
Supplies and miscellaneous expenses:			
General	\$2,774	57	
Road repairs	132	84	
			2,907 41
			\$13,441 67
Neponset River Parkway:			
Labor and teaming:			
General			\$998 88
Supplies and miscellaneous expenses:			
General	\$382	85	
Road repairs	17	09	
			399 94
			1,398 82
Furnace Brook Parkway:			
Labor and teaming:			
General	\$5,849	03	
Moth work	148	39	
			\$5,997 42
Street lighting			3,508 10
Supplies and miscellaneous expenses:			
General	\$1,826	45	
Road repairs	511	26	
			2,337 71
			11,843 23
Old Colony Parkway:			
Labor and teaming:			
General	\$16,157	81	
Moth work	180	41	
Road repairs	682	68	
			\$17,020 90
Street lighting			5,201 23
Supplies and miscellaneous expenses:			
General	\$3,728	44	
Road repairs	646	88	
			4,375 32
			26,597 45
West Roxbury Parkway:			
Labor and teaming:			
General	\$1,498	70	
Moth work	1,343	17	
Road repairs	472	87	
			\$3,314 74
Street lighting			1,081 12
Supplies and miscellaneous expenses:			
General	\$1,060	68	
Moth work	6	12	
Road repairs	918	26	
			1,985 06
			6,380 92
Dedham Parkway:			
Labor and teaming:			
General	\$34	06	
Moth work	75	61	
Road repairs	183	34	
			\$293 01
Supplies and miscellaneous expenses:			
General	\$344	60	
Moth work	3	40	
Road repairs	151	90	
			499 90
			792 91
Middlesex Fells Parkway:			
Labor and teaming:			
General	\$19,523	52	
Moth work	2,007	21	
Road repairs	1,563	58	
			23,094 31
Street lighting			17,609 71
Supplies and miscellaneous expenses:			
General	\$11,680	84	
Moth work	56	25	
Road repairs	1,480	53	
			13,217 62
			53,921 64
Mystic Valley Parkway:			
Labor and teaming:			
General	\$14,962	79	
Moth work	1,384	52	
Road repairs	1,432	55	
			\$17,779 86
Street lighting			4,401 40
Supplies and miscellaneous expenses:			
General	\$5,548	96	
Road repairs	1,380	17	
			6,929 13
Repairs and renewals			23 12
			29,133 51

Metropolitan Parks Maintenance Fund, Boulevards, General — Continued

Lynn Fells Parkway:			
Labor and teaming:			
General	\$3,354 93		
Moth work	61 69		
Road repairs	152 92		
		\$3,569 54	
Street lighting		1,445 60	
Supplies and miscellaneous expenses:			
General	\$1,065 96		
Road repairs	52 33		
		1,118 29	
			\$6,133 43
Middlesex Fells Roads:			
Labor and teaming:			
General	\$6,006 91		
Road repairs	2,899 34		
		\$8,906 25	
Street lighting		4,451 45	
Supplies and miscellaneous expenses:			
General	\$1,959 44		
Road repairs	512 22		
		2,471 66	
			15,829 36
Woburn Parkway:			
Labor and teaming:			
General	\$3,020 21		
Moth work	279 07		
		\$3,299 28	
Street lighting		223 01	
Supplies and miscellaneous expenses:			
General	\$1,181 15		
Road repairs	214 79		
		1,395 94	
			4,918 23
Alewife Brook Parkway:			
Labor and teaming:			
General	\$6,466 34		
Moth work	21 35		
Road repairs	482 35		
		\$6,970 04	
Street lighting		1,807 18	
Supplies and miscellaneous expenses:			
General	\$2,666 24		
Road repairs	620 95		
		3,287 19	
Repairs and renewals		25 28	
			12,089 69
Revere Beach Parkway:			
Labor and teaming:			
General	\$29,376 08		
Moth work	114 27		
Road repairs	4,194 70		
		\$33,685 05	
Street lighting		13,024 50	
Supplies and miscellaneous expenses:			
General	\$15,712 40		
Moth work	42 70		
Road repairs	3,352 09		
		19,107 19	
Repairs and renewals		84 43	
			65,901 17
Nahant Beach Parkway:			
Labor and teaming:			
General	\$6,104 18		
Moth work	33 68		
Road repairs	72 22		
		\$6,210 08	
Street lighting		980 00	
Supplies and miscellaneous expenses:			
General	\$240 50		
Moth work	14 13		
		254 63	
			7,444 71
Winthrop Parkway:			
Labor and teaming:			
General	\$2,519 28		
Moth work	33 67		
Road repairs	111 32		
		\$2,664 27	
Street lighting		1,486 20	
Supplies and miscellaneous expenses:			
General	\$74 85		
Moth work	16 55		
Road repairs	187 55		
		278 95	
			4,429 42

Metropolitan Parks Maintenance Fund, Boulevards, General — Concluded

Lynnway:			
Labor and teaming:			
General	\$15,622 19		
Road repairs	384 96		
		\$16,007 15	
Street lighting		828 96	
Supplies and miscellaneous expenses:			
General		3,821 14	
			\$20,657 25
Hammond Pond Parkway:			
Labor and teaming:			
General	\$422 50		
Moth work	2,076 38		
		\$2,498 88	
Supplies and miscellaneous expenses:			
General		237 63	
			2,736 51
Fresh Pond Parkway:			
Labor and teaming:			
General	\$3,888 13		
Moth work	382 50		
Road repairs	27 00		
		\$4,297 63	
Street lighting		329 24	
Supplies and miscellaneous expenses:			
General	\$910 69		
Road repairs	264 11		
		1,174 80	
Repairs and renewals		42 87	
			5,844 54
Harvard Bridge:			
Labor and teaming:			
General	\$6,218 23		
Road repairs	210 00		
		\$6,428 23	
Street lighting		1,938 17	
Supplies and miscellaneous expenses:			
General	\$528 82		
Road repairs	79 79		
		608 61	
			8,975 01
Cottage Farm Bridge:			
Labor and teaming:			
General		\$249 00	
Supplies and miscellaneous expenses:			
Road repairs		43 12	
			292 12
Neponset River Bridge:			
Labor and teaming:			
General	\$11,171 11		
Street lighting		1,101 84	
Supplies and miscellaneous expenses:			
General		1,218 95	
			13,491 90
			\$466,599 56
Balance, Dec. 1, 1929			\$40,092 96

METROPOLITAN PARKS MAINTENANCE, BOULEVARDS — SPECIALS

BLUE HILL RIVER ROAD			
Appropriation (Chapter 211, Acts of 1925, reappropriated)			\$75,000 00
Appropriation (Chapter 311, Acts of 1927)			25,000 00
			\$100,000 00
Expended to Dec. 1, 1928			99,006 53
			\$993 47
Expenditures			
Land			\$400 00
Legal:			
Services		14 93	
			414 93
Balance, Dec. 1, 1929			\$578 54
ELECTRIC LIGHTING SYSTEM			
Appropriation (Chapter 146, Acts of 1929)			\$25,000 00
(Chapter 386, Acts of 1929)			2,000 00
Balance of Chapter 137, Acts of 1928			12,543 71
			\$39,543 71

Metropolitan Parks Maintenance, Boulevards — Specials — Continued

Expenditures			
Installation of conduits, etc.:			
Contract, Coleman Bros.	\$3,516 21		
Labor and materials	14,203 76		
		\$17,719 97	
Engineering:			
Services	\$989 76		
Expenses	57 39		
		1,047 15	
Freight		151 48	
			\$18,918 60
Balance, Dec. 1, 1929			\$20,625 11

OLD COLONY BOULEVARD

Appropriation (Chapter 398, Acts of 1926)	\$250,000 00
“ (Chapter 138, Acts of 1927)	500,000 00
“ (Chapter 127, Acts of 1928)	200,000 00
	\$950,000 00
Expended to Dec. 1, 1928	889,589 51
	\$60,410 49

Expenditures			
Construction:			
Contracts:			
American Bridge Co.	\$16,169 46		
Cronin & Driscoll	13,418 58		
		\$29,588 04	
Labor and materials		10,104 96	
			\$39,693 00
Engineering:			
Services	\$2,021 35		
Expenses	373 05		
		2,394 40	
Legal:			
Services		28 86	
Miscellaneous		72 50	
			42,188 76
Balance, Dec. 1, 1929			\$18,221 73

RESURFACING BOULEVARDS AND PARKWAYS

Appropriation (Chapter 146, Acts of 1929)	\$100,000 00
Balance brought forward from 1928 appropriation to cover 1928 expenditures on 1929 books	25,105 42
	\$125,105 42

Expenditures			
General Expense:			
Engineering:			
Services	\$7,070 76		
Expenses	600 97		
		\$7,671 73	
Advertising		221 80	
			\$7,893 53
Blue Hill River Road:			
Construction:			
Labor and materials			17,678 86
Stony Brook Reservation:			
Construction:			
Contract, E. C. Sargent			6,363 43
Furnace Brook Parkway:			
Construction:			
Contracts:			
Interstate Highway Const. Corp.	\$2,485 68		
E. M. Miskell	8,370 52		
			10,856 20
Neponset River Parkway:			
Construction:			
Contract, University Excavating Co.	\$11,771 90		
Labor and materials	390 56		
			12,162 46
Middlesex Fells Reservation:			
Construction:			
Contract, James H. Fannon Estate			1,905 79
Middlesex Fells Parkway:			
Construction:			
Contract, James H. Fannon Estate			2,456 04
Revere Beach Reservation:			
Construction:			
Labor and material			5,214 92

Metropolitan Parks Maintenance, Boulevards — Specials — Continued
Resurfacing Boulevards and Parkways—Concluded

Revere Beach Parkway:			
Construction:			
Contracts:			
James H. Fannon Estate	\$9,394	70	
Simpson Bros. Corp.	17,937	87	
			\$27,332 57
Labor and materials			2,058 76
			<u>29,391 33</u>
Charles River Upper Division:			
Construction:			
Labor and materials			7,490 58
			<u>101,413 14</u>
Balance, Dec. 1, 1929			\$23,692 28

LIGHTING WEST ROXBURY PARKWAY

Appropriation (Chapter 405, Acts of 1928)	\$10,000	00
Expended to Dec. 1, 1928	7,311	37
	<u>\$2,688</u>	63

Expenditures

Installation of conduits, etc.:			
Labor and materials			2,527 30
			<u>\$161 33</u>
Balance, Dec. 1, 1929			

EXTENSION OF QUINCY SHORE RESERVATION

Appropriation (Chapter 343, Acts of 1927)	\$35,000	00
Expended to Dec. 1, 1928	887	66
	<u>\$34,112</u>	34

Expenditures

Engineering:			
Services	\$112	55	
Expenses		4 27	
			<u>\$116 82</u>
Legal:			
Services	\$105	15	
Expenses		8 42	
			<u>113 57</u>
Appraising			20 00
Advertising			50 15
			<u>300 54</u>
Balance, Dec. 1, 1929			\$33,811 80

CIRCUMFERENTIAL HIGHWAY

Appropriation (Chapter 398, Acts of 1926)	\$115,000	00
" (Chapter 386, Acts of 1929)	159,000	00
	<u>\$274,000</u>	00
Expended to Dec. 1, 1928	88,909	62
	<u>\$185,090</u>	38

Expenditures

Construction:			
Contract, Michael McDonough Co.	\$17,859	80	
Labor and materials		878 31	
			<u>\$18,738 11</u>
Engineering:			
Services	\$5,927	45	
Expenses		622 68	
			<u>6,550 13</u>
Land			42,473 65
Legal:			
Services	\$551	78	
Expenses		56 92	
			<u>608 70</u>
Advertising			76 95
			<u>68,447 54</u>
Balance, Dec. 1, 1929			\$116,642 84

LAND FOR BOULEVARD ALONG CHARLES RIVER

Appropriation (Chapter 343, Acts of 1927)	\$30,000	00
" (Chapter 127, Acts of 1928)	100,000	00
" (Chapter 146, Acts of 1929)	200,000	00
	<u>\$380,000</u>	00
Expended to Dec. 1, 1928	52,776	42
	<u>\$327,223</u>	58

Metropolitan Parks Maintenance, Boulevards — Specials — Concluded
Land for Boulevard Along Charles River — Concluded

Construction:		<i>Expenditures</i>		
Contracts:				
C. & R. Const. Co.		\$123,510	53	
Bay State Dredging & Cont. Co.		49,105	04	
Labor and materials			\$172,615	57
			15,776	69
				\$188,392 26
Engineering:				
Services			\$16,484	89
Expenses			135	01
				16,619 90
Land				4,097 00
Legal:				
Services			\$925	36
Expenses			37	18
				962 54
Advertising				83 60
				210,155 30
Balance, Dec. 1, 1929				\$117,068 28

LAND AND FILLING, BROOKLINE — NEWTON BOULEVARD

Appropriation (Chapter 358, Acts of 1929)		\$50,000	00
“(Chapter 386, Acts of 1929)		25,000	00
			\$75,000 00

Construction:		<i>Expenditures</i>		
Labor and materials				\$386 15
Engineering:				
Services			\$1,027	75
Expenses			59	76
				1,087 51
Advertising				82 95
				1,556 61
Balance, Dec. 1, 1929				\$73,443 39

CHARLES RIVER BASIN MAINTENANCE

Appropriation (Chapter 146, Acts of 1929)		\$215,400	00
Balance brought forward from 1928 appropriation to cover 1928 expenditures on 1929 books		4,268	67
			\$219,668 67

Park and Water Areas:		<i>Expenditures</i>		
Police			\$74,064	49
Labor and teaming:				
General		\$38,040	72	
Moth work		102	25	
Road repairs		592	00	
			38,734	97
Street lighting			3,930	85
Supplies and miscellaneous expenses:				
General		\$10,090	24	
Road repairs		91	33	
			10,181	57
				\$126,911 88
Locks, Gates and Drawbridges:				
General labor			\$57,073	10
General supplies and miscellaneous expenses			9,724	15
				66,797 25
Retirement payments				1,467 51
				195,176 64
Balance, Dec. 1, 1929				\$24,492 03

DREDGING BROAD AND LECHMERE CANALS

Appropriation (Chapter 127, Acts of 1928)		\$20,000	00
Expended to Dec. 1, 1929		17,419	55
			\$2,580 45
Balance, Dec. 1, 1929			

NANTASKET BEACH MAINTENANCE

Appropriation (Chapter 146, Acts of 1929)		\$85,000	00
Balance brought forward from 1928 appropriation to cover 1928 expenditures on 1929 books		1,397	16
			\$86,397 16

		<i>Expenditures</i>		
Police			\$29,248	21
Labor and teaming:				
General			34,768	14
Street lighting			2,094	42
Supplies and miscellaneous expenses:				
General		\$17,008	71	
Road repairs		425	74	
			17,434	45
				83,545 22
Balance, Dec. 1, 1929				\$2,851 94

WELLINGTON BRIDGE MAINTENANCE

Appropriation (Chapter 146, Acts of 1929)	\$18,800 00
Balance brought forward from 1928 appropriation to cover 1928 expenditures on 1929 books	1 76
	\$18,801 76
<i>Expenditures</i>	
General labor	\$14,991 14
General supplies and miscellaneous expenses	3,067 52
Retirement payments	201 03
	18,259 69
Balance, Dec. 1, 1929	
	\$542 07

BUNKER HILL MAINTENANCE

Appropriation (Chapter 146, Acts of 1929)	\$13,000 00
<i>Expenditures</i>	
Police	\$4,256 72
General labor	6,093 90
Flood lighting	258 96
Supplies and miscellaneous expenses	2,036 85
	12,646 43
Balance, Dec. 1, 1929	
	\$353 57

BUNKER HILL MAINTENANCE — SPECIAL

IMPROVEMENTS, BUNKER HILL MONUMENT AND GROUNDS

Appropriation (Chapter 405, Acts of 1928)	\$1,500 00
(Chapter 146, Acts of 1929)	10,000 00
	\$11,500 00
<i>Expenditures</i>	
Grading slopes, etc.:	
Contract, University Excavating Co.	\$3,044 07
Labor and materials	2,138 10
	\$5,182 17
Engineering:	
Services	\$621 73
Expenses	8 88
	630 61
Legal:	
Services	27 30
	5,840 08
Balance, Dec. 1, 1929	
	\$5,659 92

Analysis of 1929 Receipts

PARKS DIVISION

Credited to:	
Metropolitan Parks Const. Fund, Series I, Interest Fund	\$165 92
Metropolitan Parks Expense Fund	182,236 91
General Revenue	4,384 60
	\$186,787 43

BONDS, SINKING FUNDS AND NET DEBT

Parks Division

Metropolitan Parks Construction, Series I:	
Bonds issued:	
Sinking Fund Bonds:	
Year ending Nov. 30, 1929	
Period prior to Dec. 1, 1928	\$9,485,000 00
	\$9,485,000 00
Serial Bonds and Notes:	
Year ending Nov. 30, 1929	\$750,000 00
Period prior to Dec. 1, 1928	367,043 96
	1,117,043 96
	\$10,602,043 96
Sinking Fund Bonds paid:	
Year ending Nov. 30, 1929	
Period prior to Dec. 1, 1928	\$125,000 00
	\$125,000 00
Serial Bonds and Notes paid:	
Year ending Nov. 30, 1929	\$7,750 00
Period prior to Dec. 1, 1928	297,543 96
	305,293 96
	430,293 96
Bonds outstanding Dec. 1, 1929	\$10,171,750 00
Sinking Fund:	
Total, Dec. 1, 1929	\$6,396,353 84
Total, Dec. 1, 1928	6,095,586 46
Increase during 1929	300,767 38
Net Debt:	
Total, Dec. 1, 1929	\$3,775,396 16
Total, Dec. 1, 1928	3,333,913 54
Increase during 1929	441,482 62

Metropolitan Sewerage Construction Fund, North System — Concluded
Expenditures

New Mystic Valley Main Sewer, Sec. 109:

Construction:		
Contract:		
V. James Grande	\$119,585 23	
Labor and materials.	1,600 24	
		\$121,185 47
Engineering:		
Services	\$5,106 23	
Expenses	718 73	
		5,824 96
Legal:		
Services	\$82 55	
Expenses	4 95	
		87 50
Land damages (easement)		150 00
		\$127,247 93

New Mystic Valley Main Sewer, Sec. 110:

Construction:		
Contract:		
J. H. Ferguson Co.	\$113,036 68	
Labor and materials.	312 89	
		\$113,349 57
Engineering:		
Services	\$3,985 00	
Expenses	92 52	
		4,077 52
Legal:		
Services	\$38 02	
Expenses	3 05	
		41 07
Claims		450 00
Land damages (easement)		600 00
		118,518 16

		\$245,766 09	
Amounts charged to Dec. 1, 1928		8,356,676 37	
			\$8,602,442 46
Balance, Dec. 1, 1929			\$96,593 87

METROPOLITAN SEWERAGE CONSTRUCTION FUND, SOUTH SYSTEM

Total amount authorized to Dec. 1, 1928	\$12,520,151 75
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Receipts:		
For the year ending Nov. 30, 1929		
For the period prior to Dec. 1, 1928	\$24,599 61	
		24,599 61
		\$12,544,751 36

Expenditures

Wellesley Sewer:		
Legal:		
Services	\$27 36	
Land damages (easement)	150 00	
		\$177 36

New Neponset Valley Sewer, Sec. 107:

Construction:		
Contracts:		
Edward P. Healey	\$4,161 05	
V. Barletta Co.	25,347 85	
		\$29,508 90
Labor and materials		529 63
		\$30,038 53
Engineering:		
Services	\$8,013 95	
Expenses	1,271 41	
		9,285 36
Legal:		
Services	\$48 54	
Expenses	14 52	
		63 06
		\$39,386 95

New Neponset Valley Sewer, Sec. 108:

Construction:		
Contract:		
Frank W. Christy	\$10,144 75	
Labor and materials	410 61	
		\$10,555 36
Engineering:		
Services	\$6,644 99	
Expenses	1,691 06	
		8,336 05
Advertising		40 80
Legal:		
Services		149 27
		19,081 48

Metropolitan Sewerage Maintenance Fund, North System—General—Concluded

Expenditures

Administration and Engineering:

Salaries:

Commissioners	\$1,250 01	
Secretary and clerks	5,308 90	
Chief engineer and assistants	11,268 23	
		\$17,827 14
Rent, care and lighting of building		1,612 93
Printing		107 03
Stationery, office supplies and expenses		650 26
Engineering supplies and expenses		85 80

		\$20,283 16
Industrial accident compensation		1,315 43
Retirement payments		3,055 09

\$24,653 68

Deer Island Pumping Station:

Labor	\$36,399 87	
Fuel	14,193 77	
Oil, waste and packing	878 88	
Water	1,977 76	
Repairs and renewals	2,369 09	
General supplies	649 03	
Miscellaneous expenses	249 24	

56,717 64

East Boston Pumping Station:

Labor	\$37,002 39	
Fuel	19,477 01	
Oil, waste and packing	1,040 59	
Water	2,459 66	
Repairs and renewals	9,014 14	
General supplies	2,294 21	
Miscellaneous expenses	353 27	

71,641 27

Charlestown Pumping Station:

Labor	\$27,532 30	
Fuel	6,091 73	
Oil, waste and packing	625 42	
Water	724 98	
Repairs and renewals	730 98	
General supplies	542 66	
Miscellaneous expenses	644 36	

36,892 43

Alewife Brook Pumping Station:

Labor	\$14,639 97	
Fuel	3,461 93	
Oil, waste and packing	314 26	
Water	544 65	
Repairs and renewals	116 20	
General supplies	84 61	
Miscellaneous expenses	65 92	

19,227 54

Reading Pumping Station:

Labor	\$7,067 03	
Fuel	90 15	
Repairs and renewals	5 04	
General supplies	3,005 97	
Miscellaneous expenses	48 78	

10,216 97

Sewer Lines, Buildings and Grounds:

Engineering assistants	\$3,450 00	
Labor	72,406 15	
Deer Island Ferry	1,433 34	
Automobiles	2,933 40	
Brick, cement and lime	609 04	
Castings, ironwork and metal	279 72	
Lumber, paint and oils	3,240 03	
Machinery, tools and appliances	273 64	
Rubber and oiled goods	239 07	
Repairs, ordinary	3,051 99	
Repairs and renewals	822 71	
Sand, gravel and stone	104 47	
General supplies	2,664 51	
Miscellaneous expenses	2,585 75	

\$94,093 82

Stables:

Labor	\$2,600 00	
Hay, grain and bedding	358 76	
Vehicles, harnesses, etc.	1 00	
Miscellaneous expenses	272 42	

3,232 18

316,675 53

Balance, Dec. 1, 1929

\$43,085 31

METROPOLITAN SEWERAGE MAINTENANCE FUND, SOUTH SYSTEM — GENERAL

Appropriation (Chapter 146, Acts of 1929)	\$223,700 00
Balance brought forward from 1928 appropriation to cover 1928 expenditures on 1929 books	10,126 76
	<u>\$233,826 76</u>

Expenditures

Administration and Engineering:	
Salaries:	
Commissioners	\$1,250 01
Secretary and clerks	5,308 83
Chief engineer and assistants	8,293 00
	<u>\$14,851 84</u>
Rent, care and lighting of building	1,612 82
Printing	107 02
Stationery, office supplies and expenses	642 32
Engineering supplies and expenses	65 43
	<u>\$17,279 43</u>
Industrial accident compensation	33 00
Retirement payments	2,616 01
	<u>\$19,928 44</u>
Ward Street Pumping Station:	
Labor	\$46,103 84
Fuel	14,915 47
Oil, waste and packing	893 75
Water	3,635 18
Repairs and renewals	3,206 08
General supplies	1,017 95
Miscellaneous expenses	347 85
	<u>70,120 12</u>
Quincy Pumping Station:	
Labor	\$13,938 93
Fuel	4,344 05
Oil, waste and packing	494 94
Water	503 26
Repairs and renewals	249 08
General supplies	342 70
Miscellaneous expenses	67 19
	<u>19,940 15</u>
Nut Island Screen House:	
Labor	\$15,120 52
Fuel	4,194 99
Oil, waste and packing	187 59
Water	541 11
Repairs and renewals	134 83
General supplies	501 97
Miscellaneous expenses	205 76
	<u>20,886 77</u>
Sewer Lines, Buildings and Grounds:	
Engineering assistants	\$7,350 00
Labor	47,283 24
Automobiles	951 00
Brick, cement and lime	261 66
Castings, ironwork and metal	10 24
Freight, express and teaming	29 20
Lumber, paint and oils	992 46
Machinery, tools and appliances	66 61
Repairs, ordinary	34 25
Repairs and renewals	61 34
Rubber and oiled goods	31 49
Sand, gravel and stone	620 93
General supplies	1,558 83
Miscellaneous expenses	1,919 38
Pumping by City of Boston	11,998 37
	<u>73,169 00</u>
Stables:	
Labor	\$780 00
Hay, grain and bedding	231 28
Vehicles, harnesses and fittings	11 17
Miscellaneous expenses	118 07
	<u>1,140 52</u>
	<u>205,185 00</u>
Balance, Dec. 1, 1929	\$28,641 76

METROPOLITAN SEWERAGE MAINTENANCE FUND, SOUTH SYSTEM — SPECIAL

REPAIRS TO SEWER, GRANITE AVENUE, DORCHESTER

Appropriation (Chapter 127, Acts of 1928)	\$20,000 00
Expended to Dec. 1, 1929	17,016 62
	<u>\$2,983 38</u>
Balance, Dec. 1, 1929	\$2,983 38

Analysis of 1929 Receipts

Credited to:	
Metropolitan Sewerage Sinking Fund, North System	\$175 00
Metropolitan Sewerage Interest Fund, South System	34 00
Metropolitan Sewerage Maintenance Fund, North System	1 74
Metropolitan Sewerage Maintenance Fund, South System	83 85
	<u>\$294 59</u>

BONDS, SINKING FUNDS AND NET DEBT

Metropolitan Sewerage Construction, North System:			
Bonds issued:			
Sinking Fund Bonds:			
Year ending Nov. 30, 1929	.	.	
Period prior to Dec. 1, 1928	.	.	\$6,563,000 00
			\$6,563,000 00
Serial Bonds:			
Year ending Nov. 30, 1929	.	.	
Period prior to Dec. 1, 1928	.	.	\$1,725,500 00
			1,725,500 00
			\$8,288,500 00
Serial Bonds paid:			
Year ending Nov. 30, 1929	.	.	\$94,500 00
Period prior to Dec. 1, 1928	.	.	643,500 00
			738,000 00
Bonds outstanding Dec. 1, 1929	.	.	\$7,550,500 00
Sinking Fund:			
Total, Dec. 1, 1929	.	.	\$6,026,454 75
Total, Dec. 1, 1928	.	.	5,792,944 16
Increase during 1929	.	.	233,510 59
Net Debt:			
Total, Dec. 1, 1929	.	.	\$1,524,045 25
Total, Dec. 1, 1928	.	.	1,852,055 84
Decrease during 1929	.	.	328,010 59
Metropolitan Sewerage Construction, South System:			
Bonds issued:			
Sinking Fund:			
Year ending Nov. 30, 1929	.	.	
Period prior to Dec. 1, 1928	.	.	\$8,877,912 00
			\$8,877,912 00
Serial Bonds:			
Year ending Nov. 30, 1929	.	.	
Period prior to Dec. 1, 1928	.	.	\$1,125,000 00
			1,125,000 00
			\$10,002,912 00
Serial Bonds paid:			
Year ending Nov. 30, 1929	.	.	\$31,000 00
Period prior to Dec. 1, 1928	.	.	338,000 00
			369,000 00
Bonds outstanding Dec. 1, 1929	.	.	9,633,912 00
Sinking Fund:			
Total, Dec. 1, 1929	.	.	\$4,465,943 65
Total, Dec. 1, 1928	.	.	4,059,020 67
Increase during 1929	.	.	406,922 98
Net Debt:			
Total, Dec. 1, 1929	.	.	\$5,167,968 35
Total, Dec. 1, 1928	.	.	5,605,891 33
Decrease during 1929	.	.	437,922 98

WATER DIVISION

Construction

METROPOLITAN WATER CONSTRUCTION FUND

Total amount authorized to Dec. 1, 1928	.	.	.	.	\$47,055,000 00
Authorization (Chapter 146, Acts of 1929, Item 713)	.	.	.	.	400,000 00
" (Chapter 146, Acts of 1929, Item 712)	.	.	.	.	25,000 00
					\$47,480,000 00
Receipts:					
For the year ending Nov. 30, 1929	.	.	.	.	\$11,617 54
For the period prior to Dec. 1, 1928	.	.	.	.	310,199 88
					321,817 42
					\$47,801,817 42
Expenditures					
General:					
Contract:					
Walsh Holyoke Steam Boiler Works, Inc.	.	.	.	.	\$3,390 00
Labor	.	.	.	.	3,065 53
Supplies	.	.	.	.	1,413 45
Purchase of land	.	.	.	.	10,000 00
					\$17,868 98
Stock transferred to other accounts	.	.	.	.	184 61
					\$17,684 37

Metropolitan Water Construction Fund — Concluded

Certain Improvements:			
Low Service, Section 51:			
Construction:			
Contract:			
George M. Bryne	.	.	\$2,100 00
Southern High Service, Section 52:			
Construction:			
Labor and materials	.	.	\$1,671 19
Engineering expenses	.	.	1 80
Purchase of land	.	.	10,720 00
Legal:			
Services	.	.	\$15.56
Expenses	.	.	9 68
			25 24
			\$12,418 23
Stock transferred to other accounts	.	.	3,417 97
			9,000 26
			\$11,100 26
Property for Protection of Water Supply:			
Purchase of land	.	.	\$92,440 30
Legal:			
Services	.	.	\$534 92
Expenses	.	.	18 16
			553 08
			92,993 38
Additional Weston Aqueduct Supply Mains:			
Construction:			
Contract:			
A. G. Tomasello Sons, Inc.	.	.	\$152,747 98
Labor and materials	.	.	4,000 30
			\$156,748 28
Engineering:			
Services	.	.	\$16,068 33
Expenses	.	.	755 70
			16,824 03
Advertising bids	.	.	28 85
Stock:			
Contract:			
Michigan Valve & Foundry Co.	.	.	\$19,356 20
Other stock	.	.	384 21
			19,740 41
			193,341 57
			\$315,119 58
Amounts charged to Dec. 1, 1928	.	.	47,194,100 08
			\$47,509,219 66
Balance, Dec. 1, 1929	.	.	\$292,597 76

METROPOLITAN WATER MAINTENANCE FUND — GENERAL

Appropriation (Chapter 146, Acts of 1929)	\$876,200 00
Balance brought forward from 1928 appropriation to cover 1928 expenditures on 1929 books	71,404 36
	\$947,604 36

Expenditures

Administration and Engineering:			
Salaries:			
Commissioners	.	.	\$2,500 00
Secretary and clerks	.	.	10,617 76
Chief engineer and assistants	.	.	28,400 59
			\$41,518 35
Rent, care and lighting of building	.	.	3,225 76
Printing	.	.	214 06
Stationery, office supplies and expenses	.	.	1,529 70
Engineering supplies and expenses	.	.	2,547 73
			\$49,035 60
Payments in lieu of taxes	.	.	74,431 86
Industrial accident compensation	.	.	2,882 80
Retirement payments	.	.	10,216 26
			\$136,566 52
Wachusett Department:			
Superintendence:			
Labor	.	.	\$12,780 03
Supplies and expenses	.	.	2,525 23
			\$15,305 26
Reservoir:			
Labor	.	.	\$15,092 11
Supplies and expenses	.	.	1,925 31
			17,017 42
Forestry:			
Labor	.	.	\$18,079 98
Supplies and expenses	.	.	2,020 13
			20,100 11

Metropolitan Water Maintenance Fund — General — Continued

Protection of Supply:					
Labor	.	.	.	\$4,009 33	
Supplies and expenses	.	.	.	706 64	
					\$4,715 97
Buildings and Grounds:					
Labor	.	.	.	\$4,856 17	
Supplies and expenses	.	.	.	1,943 67	
					6,799 84
Wachusett Dam:					
Labor	.	.	.	\$14,568 51	
Supplies and expenses	.	.	.	3,201 92	
					17,770 43
Wachusett Aqueduct:					
Labor	.	.	.	\$11,783 16	
Supplies and expenses	.	.	.	1,535 03	
					13,318 19
Clinton Sewerage System:					
Pumping Station:					
Labor	.	.	.	\$1,222 40	
Supplies and expenses	.	.	.	1,574 12	
				\$2,796 52	
Sewers, screens and filter beds:					
Labor	.	.	.	\$7,927 99	
Supplies and expenses	.	.	.	2,304 25	
				10,232 24	13,028 76
Sanitary inspection:					
Labor	.	.	.	\$1,049 47	
Supplies and expenses	.	.	.	569 76	
					1,619 23
Swamp drainage:					
Labor	.	.	.	\$14,470 09	
Supplies and expenses	.	.	.	1,035 53	
					15,505 62
Power Plant:					
Labor	.	.	.	\$9,235 64	
Supplies and expenses	.	.	.	1,961 66	
					\$11,197 30
Wachusett-Sudbury Power Transmission Line:					
Supplies and expenses	.	.	.	252 42	
					\$136,630 55
Sudbury Department:					
Superintendence:					
Labor	.	.	.	\$13,955 00	
Supplies and expenses	.	.	.	3,424 30	
					\$17,379 30
Ashland Reservoir:					
Labor	.	.	.	\$3,996 59	
Supplies and expenses	.	.	.	216 19	
					4,212 78
Hopkinton Reservoir:					
Labor	.	.	.	\$3,749 44	
Supplies and expenses	.	.	.	770 26	
					4,519 70
Whitehall Reservoir:					
Labor	.	.	.	\$4,324 00	
Supplies and expenses	.	.	.	42 22	
					4,366 22
Framingham Reservoirs, 1, 2 and 3:					
Labor	.	.	.	\$14,441 67	
Supplies and expenses	.	.	.	1,461 33	
					15,903 00
Sudbury Reservoir					
Labor	.	.	.	\$14,436 07	
Supplies and expenses	.	.	.	3,271 62	
					17,707 69
Lake Cochituate:					
Labor	.	.	.	\$10,086 25	
Supplies and expenses	.	.	.	1,409 19	
					11,495 44
Marlborough Brook Filters:					
Labor	.	.	.	\$5,321 61	
Supplies and expenses	.	.	.	260 11	
					5,581 72

Metropolitan Water Maintenance Fund — General — Continued

Pegan Filters:					
Labor				\$5,790 59	
Supplies and expenses	.	.	.	923 37	
					\$6,713 96
Sudbury and Cochrutuate Watersheds:					
Labor				\$6,162 66	
Supplies and expenses	.	.	.	288 00	
					6,450 66
Sanitary inspection:					
Labor	.	.	.	\$4,305 69	
Supplies and expenses	.	.	.	348 11	
					4,653 80
Cochituate Aqueduct:					
Labor	.	.	.	\$5,709 36	
Supplies and expenses	.	.	.	1,125 80	
					6,835 16
Sudbury Aqueduct:					
Labor	.	.	.	\$11,002 39	
Supplies and expenses	.	.	.	522 67	
					11,525 06
Weston Aqueduct:					
Labor	.	.	.	\$9,074 99	
Supplies and expenses	.	.	.	2,985 27	
					12,060 26
Forestry:					
Labor	.	.	.	\$10,409 44	
Supplies and expenses	.	.	.	151 83	
					10,561 27
Power Plant:					
Labor	.	.	.	\$13,879 88	
Supplies and expenses	.	.	.	1,802 09	
					15,681 97
So. Sudbury Pipe Line and Pumping Station:					
Labor	.	.	.	\$237 09	
Supplies and expenses	.	.	.	1,577 87	
					1,814 96
					\$157,462 95
Distribution Department:					
Superintendence:					
Labor	.	.	.	\$13,555 00	
Supplies and expenses	.	.	.	2,481 19	
					\$16,036 19
Arlington Reservoir:					
Labor	.	.	.	\$157 00	
Supplies and expenses	.	.	.	20 19	
					177 19
Bear Hill Reservoir:					
Labor	.	.	.	\$367 50	
Supplies and expenses	.	.	.	59 89	
					427 39
Bellevue Reservoir:					
Labor	.	.	.	\$380 83	
Supplies and expenses	.	.	.	128 64	
					509 47
Chestnut Hill Reservoir:					
Labor	.	.	.	\$23,519 31	
Supplies and expenses	.	.	.	24,166 34	
					47,685 65
Fells Reservoir:					
Labor	.	.	.	\$1,293 25	
Supplies and expenses	.	.	.	263 66	
					1,556 91
Fisher Hill Reservoir:					
Labor	.	.	.	\$2,040 37	
Supplies and expenses	.	.	.	242 18	
					2,282 55
Forbes Hill Reservoir:					
Labor	.	.	.	\$2,350 89	
Supplies and expenses	.	.	.	271 73	
					2,622 62
Mystic Reservoir:					
Labor	.	.	.	\$1,035 95	
Supplies and expenses	.	.	.	453 45	
					1,489 40

Metropolitan Water Maintenance Fund — General — Continued

Spot Pond Reservoir:				
Labor	.	.	.	\$10,355 66
Supplies and expenses	.	.	.	2,736 56
				<u>\$13,092 22</u>
Waban Hill Reservoir:				
Labor	.	.	.	\$287 42
Supplies and expenses	.	.	.	311 70
				<u>599 12</u>
Weston Reservoir:				
Labor	.	.	.	\$7,884 62
Supplies and expenses	.	.	.	1,856 13
				<u>9,740 75</u>
Mystic Lake, Conduit and Pumping Station:				
Labor	.	.	.	\$1,528 25
Supplies and expenses	.	.	.	669 49
				<u>2,197 74</u>
Low Service Pipe Lines:				
Labor	.	.	.	\$46,566 19
Supplies and expenses	.	.	.	11,261 32
				<u>57,827 51</u>
Northern High Service Pipe Lines:				
Labor	.	.	.	\$13,240 68
Supplies and expenses	.	.	.	2,195 23
				<u>15,435 91</u>
Northern Extra High Service Pipe Lines:				
Labor	.	.	.	\$428 56
Supplies and expenses	.	.	.	97 87
				<u>526 43</u>
Southern High Service Pipe Lines:				
Labor	.	.	.	\$12,959 23
Supplies and expenses	.	.	.	1,881 90
				<u>14,841 13</u>
Southern Extra High Service Pipe Lines:				
Labor	.	.	.	\$588 53
Supplies and expenses	.	.	.	1,246 33
				<u>1,834 86</u>
Supply Pipe Lines:				
Labor	.	.	.	\$2,732 16
Supplies and expenses	.	.	.	838 23
				<u>3,570 39</u>
Chestnut Hill Pipe Yard:				
Labor	.	.	.	\$2,177 23
Supplies and expenses	.	.	.	819 01
				<u>2,996 24</u>
Glenwood Pipe Yard:				
Labor	.	.	.	\$2,932 94
Supplies and expenses	.	.	.	701 52
				<u>3,634 46</u>
Stables and garages:				
Labor	.	.	.	\$3,557 52
Supplies and expenses	.	.	.	6,998 80
				<u>10,556 32</u>
Venturi meters:				
Labor	.	.	.	\$1,491 76
Supplies and expenses	.	.	.	123 48
				<u>1,615 24</u>
Measurement of water:				
Labor	.	.	.	\$3,299 56
Supplies and expenses	.	.	.	725 77
				<u>4,025 33</u>
Chlorination of water:				
Supplies and expenses	.	.	.	3 00
				<u>\$215,284 02</u>
Credit on account of labor for Parks Division	.	.	.	90 80
Credit on account of stock transfers	.	.	.	437 65
				<u>\$214,755 57</u>
Pumping Service:				
Superintendence:				
Labor	.	.	.	\$8,570 00
Supplies and expenses	.	.	.	1,052 98
				<u>\$9,622 98</u>
Arlington Pumping Station:				
Labor	.	.	.	\$14,000 50
Supplies and expenses	.	.	.	5,999 47
				<u>19,999 97</u>

Metropolitan Water Maintenance Fund — General — Concluded

Chestnut Hill High Service Station, No. 1:			
Labor		\$35,892 29	
Supplies and expenses		28,853 20	
			\$64,745 49
Chestnut Hill Low Service Station, No. 2:			
Labor		\$49,642 90	
Supplies and expenses		33,453 38	
			83,096 28
Spot Pond Pumping Station:			
Labor		\$19,348 70	
Supplies and expenses		14,909 50	
			34,258 20
Hyde Park Pumping Station:			
Labor		\$11,877 41	
Supplies and expenses		3,356 99	
			15,234 40
Booster pumping			7,133 87
			\$234,091 19
			\$879,506 78
Balance, Dec. 1, 1929			\$68,097 58

METROPOLITAN WATER MAINTENANCE FUND — DEFICIENCY APPROPRIATION

Appropriation (Chapter 146, Acts of 1929, Item 714)	\$74 85
Clinton Water Department (repairs)	74 85

METROPOLITAN WATER MAINTENANCE FUND — SPECIAL

NEW NORTHERN HIGH SERVICE PIPE LINES

Appropriation (Chapter 138, Acts of 1927, Item 712)	\$15,000 00
“(Chapter 127, Acts of 1928, Item 717)	325,000 00
	\$340,000 00
Expended to Dec. 1, 1928	61,113 50
	\$278,886 50

Expenditures

Section 53:			
Construction:			
Contract:			
C. & R. Const. Co.	\$149,835 85		
Labor and material	7,858 58		
		\$157,694 43	
Engineering:			
Services	\$21,649 63		
Expenses	641 97		
		22,291 60	
Stock:			
Contract:			
Chapman Valve Mfg. Co.	8,531 09		
		\$188,517 12	
Stock transferred to other accounts		1,248 40	
			\$187,268 72
Revere:			
Engineering:			
Services		\$2,682 46	
Expenses		5 18	
			2,687 64
			189,956 36
Balance, Dec. 1, 1929			\$88,930 14

WESTON AND NEWTON SUPPLY MAIN

Appropriation (Chapter 138, Acts of 1927, Item 713)	\$15,000 00
Expended to Dec. 1, 1928	11,866 76
	\$3,133 24

Expenditures

Construction:			
Labor and material			\$235 80
Engineering:			
Services		\$2,873 74	
Expenses		3 45	
			2,877 19
Advertising			20 25
			\$3,133 24

Metropolitan Water Maintenance Fund — Specials — Concluded
HIGH DUTY ENGINE, ARLINGTON PUMPING STATION

Appropriation (Chapter 138, Acts of 1927, Item 716)	\$40,000 00
Expended to Dec. 1, 1928	37,020 79
	<u>\$2,979 21</u>

Expenditures

Construction:		
Contract:		
Murray Iron Works Co.	\$2,611 90	
Labor and material	181 30	
	<u>2,793 20</u>	
Balance, Dec. 1, 1929		\$186 01

Analysis of 1929 Receipts

Credited to:		
Metropolitan Water Construction Fund	\$11,617 54	
Metropolitan Water Sinking Fund	156,879 36	
Metropolitan Water Maintenance Fund	2,335 65	
	<u>\$170,832 55</u>	

BONDS, SINKING FUNDS AND NET DEBT

Metropolitan Water Construction:		
Bonds issued:		
Sinking Fund:		
Year ending Nov. 30, 1929		
Period prior to Dec. 1, 1928	\$41,398,000 00	
	<u>\$41,398,000 00</u>	
Serial Bonds:		
Year ending Nov. 30, 1929		
Period prior to Dec. 1, 1928	\$4,287,000 00	
	<u>4,287,000 00</u>	
		\$45,685,000 00
Serial Bonds paid:		
Year ending Nov. 30, 1929	\$115,000 00	
Period prior to Dec. 1, 1928	852,000 00	
	<u>967,000 00</u>	
Bonds outstanding Dec. 1, 1929		\$44,718,000 00
Sinking Fund:		
Total, Dec. 1, 1929	\$27,289,232 99	
Total, Dec. 1, 1928	25,991,504 08	
	<u>1,297,728 91</u>	
Increase during 1929		1,297,728 91
Net Debt:		
Total, Dec. 1, 1929	\$17,428,767 01	
Total, Dec. 1, 1928	18,841,495 92	
	<u>1,412,728 91</u>	
Decrease during 1929		1,412,728 91
Metropolitan Additional Water Construction:		
Bonds issued:		
Serial Bonds:		
Year ending Nov. 30, 1929	\$6,000,000 00	
Period prior to Dec. 1, 1928	5,000,000 00	
	<u>\$11,000,000 00</u>	
Serial Bonds paid:		
Year ending Nov. 30, 1929	\$185,000 00	
Period prior to Dec. 1, 1928	50,000 00	
	<u>235,000 00</u>	
Bonds outstanding Dec. 1, 1929		10,765,000 00
Net Debt (under Metropolitan District Water Supply Commission):		
Total, Dec. 1, 1929	\$10,765,000 00	
Total, Dec. 1, 1928	4,950,000 00	
	<u>5,815,000 00</u>	
Increase during 1929		5,815,000 00
Total Net Debt, Dec. 1, 1929	\$28,193,767 01	
Total Net Debt, Dec. 1, 1928	23,791,495 92	
	<u>4,402,271 09</u>	
Total increase during 1929		4,402,271 09

APPENDIX No. 1

CONTRACTS MADE AND PENDING DURING

Contract Number	WORK	Number of Bids	Lowest
126 ¹	Construction of sea wall, King's Beach Reservation, Swampscott.	7	\$9,273 00
127	Construction Soldier's Field Road, Western Avenue to Chilmark Street, Boston, Brighton District.	15	127,086 00
128 ¹	Construction Carlton Street Extension, Commonwealth Avenue to Mountfort Street, Brookline.	9	32,837 00
129 ¹	Resurfacing Furnace Brook Parkway, between Quarry Street and Cross Street, Quincy.	7	6,027 00
130 ¹	Construction Neponset River Parkway (formerly Regent Street) from Milton Street to north of Waterloo Street, Boston, Hyde Park District.	9	14,899 00
131 ¹	Widening and resurfacing Revere Beach Parkway, Main Street to Second Street, Everett.	2	19,223 50
133	Construction Lynn Fells Parkway, Bellevue Avenue, Melrose, to Newburyport Turnpike, Saugus.	20	174,226 60
134 ²	Construction West Roxbury Parkway, Newton Street to Hammond Street, Brookline.	17	31,464 00
135	Relocating, grading and surfacing Hillside Street, easterly from Blue Hill River Road, Blue Hills Reservation, Milton.	9	6,063 00
136	Change in alignment of Administration Road, easterly from Sassamon Road, Blue Hills Reservation, Quincy.	7	11,072 50

¹ Contract completed.

² Second lowest bidder.

APPENDIX No. 1

THE YEAR 1929—PARKS DIVISION

Contractor	Date of Contract	Date of Completion	Value of Work done Dec. 31, 1929
Leo J. Nawn, Inc.	May 9, 1929	July 15, 1929	\$9,092 08
C. & R. Construction Company	June 6, 1929		175,706 20
University Excavating Company	July 3, 1929	Oct. 10, 1929	46,865 72
E. M. Miskell	Aug. 8, 1929	Sept. 18, 1929	8,370 52
University Excavating Company	Aug. 8, 1929	Nov. 27, 1929	19,740 37
Simpson Bros, Corp.	Sept. 19, 1929	Nov. 7, 1929	21,103 38
M. McDonough Co.	Sept. 26, 1929		61,257 99
C. & R. Construction Company	Oct. 31, 1929		4,422 30
University Excavating Company	Nov. 7, 1929		741 00
Raimo & Panackio	Dec. 5, 1929		1,318 50

APPENDIX No. 2

CONTRACTS MADE AND PENDING DURING

(The details of Contracts made before

1 Number of Contract	2 WORK	3 Number of Bids	AMOUNT OF BID		6 Contractor
			4 Next to Lowest	5 Lowest	
61 ¹	Pumping Engine for Arlington Pumping Station.	3	\$27,700 00	\$26,119 00 ²	Murray Iron Works Co., Burlington, Iowa.
65 ¹	Furnishing Water Valves, 10 12-inch; 12 16-inch; 2 20-inch; 4 24-inch, and 4 30-inch screw lift valves.	6	16,300 00	14,750 00 ²	The Chapman Valve Manufacturing Co., Indian Orchard, Mass.
66 ¹	Furnishing and laying 30-inch automatic electric arch-welded steel water pipes.	14	208,310 00	193,360 00 ²	C. & R. Construction Co., Boston.
68 ¹	Furnishing water valves, 16 16-inch and 12 36-inch screw lift valves.	3	30,240 00	22,672 00 ²	Michigan Valve & Foundry Co., Detroit, Mich.
69 ¹	Furnishing and laying 60-inch, 48-inch, 42-inch and 36-inch electric welded steel water pipes in Boston and Cambridge.	9	156,284 00	153,550 00 ²	A. G. Tomasello & Son, Inc., Boston.
70 ¹	Relaying 2 lines of Southern High Service Pipe lines on Adams Street Bridge, Milton.	-3	-3	-3	Walsh Holyoke Steam Boiler Works, Inc., Holyoke, Mass.
71 ¹	Resurfacing northerly side of Western Avenue between Soldiers Field Road and Spurr Street in Brighton.	4	28,350 25	27,985 00 ²	John McCourt Co., Inc., Boston.
51-M ¹	Sale and purchase of electric energy to be developed at Wachusett Dam in Clinton.	1	-	\$5.30 per M kilowatt hours.	New England Power Company and Edison Electric Illuminating Company of Boston.
Agreement ¹	Sale and purchase of electric energy to be developed at Sudbury Dam in Southborough.	-4	-4	-4	Edison Electric Illuminating Company of Boston.
33-M ¹	Furnishing and erecting fence at Chestnut Hill Reservoir	5	\$9,854 00	\$9,384 00 ²	Security Fence Co., Somerville, Mass.
35-M	Sale and purchase of electric energy to be developed at Wachusett Dam in Clinton.	-3	-3	-3	New England Power Company and Edison Electric Illuminating Company of Boston.

¹ Contract completed.² Contract based upon this bid.³ Competitive bids were not received.⁴ Sale of energy continued since January 1, 1922, at same price as formerly under modified extension of Contract No. 39-M.

APPENDIX No. 2

THE YEAR 1929—WATER DIVISION

1929 have been given in previous reports.)

7	8		10
Date of Contract	Date of Completion of Contract	Prices of Principal Items of Contracts	Value of Work done Dec. 31, 1929
Dec. 1, 1927	June 5, 1929	See Annual Report for 1927	\$26,373 73
Apr. 12, 1928	Feb. 5, 1929	See Annual Report for 1928	14,863 59
July 5, 1928	Dec. 10, 1929	See Annual Report for 1928	205,926 15
Feb. 21, 1929	Nov. 4, 1929	For 16-inch screw lift valves, \$295.75; 36-inch, \$1,495.00 per valve.	22,772 00
May 1, 1929	Dec. 11, 1929	For furnishing and laying electric welded steel pipe,—60-inch pipe \$18.00, 48-inch pipe \$16.00, and 42-inch and 36-inch pipes \$15.00 per lin. ft.; for furnishing and laying vitrified drain pipe,—15-inch pipe \$3.00 and 12-inch pipe \$2.00 per lin. ft.; for laying cast-iron pipe furnished by the Commonwealth,—16-inch and 12-inch pipes \$4.00, and 6-inch pipe \$2.00 per lin ft.; for rock excavation \$20.00 per cu. yd.; for earth excavation \$2.00 per cu. yd.; for valve chambers \$100 per chamber; for manholes for vitrified pipe drains, \$80 per manhole; for concrete masonry \$8.00 per cu. yd.	171,300 59
Apr. 26, 1929	Sept. 7, 1929	Furnishing and erecting complete in place 24-inch steel pipes for permanent pipe lines on Adams Street Bridge, Milton.	3,390 00
Nov. 14, 1929	Dec. 16, 1929	For resetting edgestones, \$0.50 per lin. ft.; for relaying granite block pavement along edge of roadway, \$0.90 per lin. ft.; for Warrenite bitulithic pavement on concrete base, \$4.60 per sq. yd.; for bituminous macadam pavement, \$2.50 per sq. yd.	30,311 45
Jan. 13, 1917	Feb. 28, 1929	See Annual Report for 1917	436,129 42
Jan. 1, 1922	Feb. 28, 1929	See Annual Report for 1922	223,031 74
Nov. 30, 1928	May 31, 1929	See Annual Report for 1928	9,582 52
Mar. 1, 1929	-	Sale and purchase to include on week days, excepting Saturday afternoons and legal holidays, all electricity generated after deduction of that used by Commission in connection with operation of its works in Wachusett Section. Contract to continue until terminated by either party by giving 6 months' notice, but not earlier than March 1, 1939.	55,224 81

CONTRACTS MADE AND PENDING DURING

1 Num- ber of Con- tract	2 WORK	3 Num- ber of Bids	AMOUNT OF BID		6 Contractor
			4 Next to Lowest	5 Lowest	
36-M	Sale and purchase of electric energy to be developed at Sudbury Dam in Southborough.	-3	-3	-3	Edison Electric Illuminat- ing Company of Boston.
37-M ¹	Construction of foot bridge on pipe arch over Sudbury River in Framingham and Wayland.	5	\$1,990 00	1,678 00 ²	W. A. Snow Iron Works, Inc., Boston.
38-M ¹	Furnishing and erecting fence for Chestnut Hill Reservoir	5	11,447 40	11,343 60 ²	Security Fence Company Somerville, Mass.
39-M	2 Special Type Y Register Indicator Recorders.	-3	-3	-3	Builders Iron Foundry Providence, R. I.
40-M	Switching equipment at Wa- chusett Power Station, Clinton.	-3	-3	-3	Westinghouse Electric & Manufacturing Com- pany, Pittsburgh, Penn- sylvania.

¹ Contract completed.
² Contract based upon this bid.
³ Competitive bids were not received,

THE YEAR 1929—WATER DIVISION—Continued

7	8	9	10
Date of Contract	Date of Completion of Contract	Prices of Principal Items of Contracts.	Value of Work done Dec. 31, 1929
Mar. 1, 1929	-	Sale and purchase to include all electricity generated after deduction of that used by Commission in connection with operation of its Sudbury Power Station. Contract to continue for 10 years.	\$29,141 07
June 20, 1929	Sept. 3, 1929	Constructing steel foot bridge on pipe arch over Sudbury River in Framingham and Wayland	1,678 00
Aug. 1, 1929	Dec. 10, 1929	Furnishing and erecting 3,620 lin. ft. of regular picket fence to match existing picket fence, \$8,253.60 (\$2.28 per ft.); furnishing and erecting double drive gate, \$100; furnishing and erecting stone posts, special picket fence and gates at effluent chamber No. 1, \$1,940; furnishing and erecting stone posts, special picket fence and gates at effluent chamber No. 2, \$1,050	11,694 70
Nov. 12, 1929	-	For furnishing 2 special Type Y Register Indicator Recorders, \$600 each, with understanding that the 2 old Type V instruments, with mercury, shall be returned by Commission.	1,200 00
Dec. 12, 1929	-	Installing 3 electrically-operated line circuit breakers, making alterations and replacements in allied apparatus, etc., \$8,700.	-

CONTRACTS MADE AND PENDING DURING THE YEAR 1929—WATER DIVISION
Concluded

Summary of Contracts, 1895 to 1929, Inclusive ¹

	Value of Work done Dec. 31, 1929
Distribution Section, 6 contracts	\$448,563 78
Pumping Service, 1 contract	26,373 73
	\$474,937 51
464 contracts completed from 1896 to 1928	21,024,064 29
	\$21,499,001 80
Deduct for work done on 11 Sudbury Reservoir contracts by the city of Boston. .	512,000 00
Total of 471 contracts	\$20,987,001 80

¹ In this summary contracts for the sale of used material and contracts charged to maintenance are excluded.

APPENDIX No. 3

TABLE No. 1. — Monthly Rainfall in Inches at Various Places on the Metropolitan Water Works, 1929

PLACE	January	February	March	April	May	June	July	August	September	October	November	December	Totals
Wachusett Watershed:													
Princeton	5.42	4.31	3.32	5.57	4.52	2.07	0.71	1.42	1.57	3.01	3.17	3.04	38.13
Jefferson	4.90	4.41	3.38	5.79	4.62	3.73	0.72	1.62	2.31	3.29	3.20	3.28	41.25
Sterling	4.56	4.26	3.50	6.03	4.98	3.10	1.25	1.24	1.63	2.92	2.93	3.31	39.71
Boylston	4.34	4.12	3.39	5.94	4.38	3.46	0.71	1.70	2.51	3.28	3.24	3.56	40.63
Sudbury Watershed:													
Sudbury Dam	4.12	3.76	3.24	7.22	3.57	1.68	0.95	2.30	1.62	2.77	2.97	3.93	38.13
Framingham	3.90	3.86	3.14	7.43	3.62	1.71	0.95	2.22	1.91	2.90	2.98	4.04	38.66
Ashland Dam	3.87	3.82	2.97	7.03	3.58	2.11	0.95	1.79	2.35	2.82	2.97	3.96	38.22
Cordaville	4.06	3.93	3.20	7.54	3.84	1.10	0.77	2.23	2.54	2.91	2.96	4.37	39.45
Lake Cochituate	4.00	3.59	3.17	7.40	3.36	1.86	0.93	1.93	1.21	2.97	3.04	4.30	37.76
Chestnut Hill Reservoir	4.18	4.51	2.90	9.19	3.28	3.32	1.59	1.57	1.40	2.68	2.98	3.88	41.48
Spot Pond	3.98	4.71	3.23	8.52	3.34	1.93	1.41	4.45	1.46	2.53	3.24	4.20	43.00
Average of all	4.30	4.12	3.22	7.06	3.92	2.37	0.99	2.04	1.87	2.92	3.06	3.81	39.68
Average, Wachusett Watershed	4.80	4.28	3.40	5.83	4.62	3.09	0.85	1.50	2.00	3.12	3.14	3.30	39.93
Average, Sudbury Watershed	3.98	3.84	3.14	7.31	3.65	1.65	0.91	2.14	2.10	2.85	2.97	4.08	38.62

TABLE NO. 2. — *Rainfall in Inches at Chestnut Hill Reservoir, 1929*

DATE	Amount	Duration	DATE	Amount	Duration
Jan. 1 . . .	.60	10.30 A.M. to	May 14 . . .	.29	3.45 P.M. to
Jan. 2 . . .		2.50 A.M.	May 15 . . .		3.00 P.M.
Jan. 6 . . .	1.25	12.50 A.M. to 3.00 P.M.	May 16 . . .	.02	2.45 P.M. to 3.15 P.M.
Jan. 10 . . .	.45 ²	1.50 A.M. to 1.00 P.M.	May 19 . . .	.88	2.40 A.M. to 10.00 P.M.
Jan. 12 . . .	.20	1.30 A.M. to 7.00 A.M.	May 21 . . .	.59	2.00 A.M. to 9.15 P.M.
Jan. 13 . . .	.24 ¹	4.20 P.M. to 7.30 P.M.	May 24 . . .	.43	5.50 P.M. to
Jan. 15 . . .	.39 ¹	12.15 A.M. to 11.45 A.M.	May 25 . . .		12.45 A.M.
Jan. 17 . . .	.06 ¹	9.00 A.M. to 11.00 A.M.			
Jan. 17 . . .	.25	12.45 P.M. to 10.45 P.M.		3.28	
Jan. 23 . . .	.02 ¹	1.45 A.M. to 5.30 A.M.			
Jan. 25 . . .	.51 ¹	10.00 A.M. to	June 3 . . .	.02	8.00 P.M. to 8.15 P.M.
Jan. 26 . . .		2.15 A.M.	June 4 . . .	.01	3.00 P.M. to 3.20 P.M.
Jan. 31 . . .	.21	12.15 P.M. to	June 5 . . .	.02	11.00 P.M. to 11.30 P.M.
Feb. 1 . . .		8.30 A.M.	June 7 . . .	.07	2.00 P.M. to 3.30 P.M.
	4.18		June 15 . . .	.19	2.15 A.M. to 2.45 A.M.
			June 15 . . .	.15	1.30 P.M. to 8.00 P.M.
			June 19 . . .	.08	3.40 P.M. to
Feb. 1 . . .	.04 ¹	7.45 P.M. to 10.00 P.M.	June 20 . . .		2.15 A.M.
Feb. 6 . . .	1.19	7.10 P.M. to	June 22 . . .	.67	6.40 A.M. to 9.45 A.M.
Feb. 7 . . .		5.30 P.M.	June 24 . . .	.96	3.45 P.M. to 9.40 P.M.
Feb. 9 . . .	.21	7.30 P.M. to	June 25 . . .	.86	10.00 P.M. to
Feb. 10 . . .		7.30 A.M.	June 26 . . .		1.30 A.M.
Feb. 14 . . .	.16 ¹	1.15 A.M. to 8.00 P.M.	June 28 . . .	.29	5.45 P.M. to 11.45 P.M.
Feb. 19 . . .	.50 ¹	7.30 P.M. to		3.32	
Feb. 20 . . .		5.20 A.M.			
Feb. 21 . . .	1.05 ¹	7.30 A.M. to 7.00 P.M.	July 5 . . .	.29	1.15 P.M. to
Feb. 26 . . .	1.07 ²	8.30 A.M. to	July 6 . . .		10.00 A.M.
Feb. 27 . . .		4.30 A.M.	July 10 . . .	.02	4.30 P.M. to 6.00 P.M.
Feb. 28 . . .	.29 ¹	8.30 A.M. to	July 14 . . .	.19	12.30 P.M. to 4.30 P.M.
Mar. 1 . . .		3.30 A.M.	July 19 . . .	.62	1.45 A.M. to 7.00 A.M.
	4.51		July 25 . . .	.47	6.15 A.M. to 8.45 P.M.
				1.59	
Mar. 2 . . .	.44 ²	5.40 P.M. to	Aug. 1 . . .	.07	5.00 P.M. to 5.45 P.M.
Mar. 3 . . .		12.30 A.M.	Aug. 3 . . .	.47	7.45 P.M. to
Mar. 4 . . .	1.28 ²	3.45 P.M. to	Aug. 4 . . .		3.30 A.M.
Mar. 6 . . .		5.15 A.M.	Aug. 9 . . .	.04	5.05 A.M. to 8.00 A.M.
Mar. 7 . . .	.07	2.45 A.M. to 5.30 A.M.	Aug. 9 . . .	.10	7.10 P.M. to 8.00 P.M.
Mar. 7 . . .	.03 ²	9.45 A.M. to 11.00 A.M.	Aug. 13 . . .	.02	6.30 A.M. to
Mar. 14 . . .	.68	12.30 A.M. to 9.00 P.M.	Aug. 14 . . .		8.00 A.M.
Mar. 15 . . .	.07	7.10 P.M. to	Aug. 19 . . .	.30	5.15 A.M. to 4.00 P.M.
Mar. 16 . . .		5.45 A.M.	Aug. 23 . . .	.54	7.45 P.M. to
Mar. 22 . . .	.08	11.10 P.M. to	Aug. 24 . . .		2.50 A.M.
Mar. 23 . . .		7.30 A.M.	Aug. 27 . . .	.03	8.00 P.M. to 8.45 P.M.
Mar. 23 . . .	.05	2.20 P.M. to 9.30 P.M.		1.57	
Mar. 25 . . .	.17	3.40 P.M. to			
Mar. 26 . . .		10.00 A.M.	Sept. 5 . . .	.06	9.00 A.M. to 3.00 P.M.
Mar. 28 . . .	.03	10.00 A.M. to 4.00 P.M.	Sept. 6 . . .	.15	1.45 A.M. to 7.00 A.M.
	2.90		Sept. 6 . . .	.14	11.15 A.M. to
			Sept. 7 . . .		4.45 A.M.
Apr. 1 . . .	.11	8.00 A.M. to 8.10 P.M.	Sept. 7 . . .	.05	9.00 P.M. to
Apr. 4 . . .	.02	3.15 A.M. to 3.40 A.M.	Sept. 9 . . .		1.30 A.M.
Apr. 4 . . .	.14	6.45 P.M. to 9.00 P.M.	Sept. 9 . . .	.25	9.00 A.M. to
Apr. 6 . . .	.09	12.45 A.M. to 10.00 A.M.	Sept. 10 . . .		3.00 A.M.
Apr. 8 . . .	.12	10.45 P.M. to	Sept. 13 . . .	.06	8.00 P.M. to
Apr. 9 . . .		7.00 A.M.	Sept. 14 . . .		4.30 A.M.
Apr. 10 . . .	.40 ¹	6.10 A.M. to 5.30 P.M.	Sept. 14 . . .	.33	12.30 P.M. to
Apr. 12 . . .	.96 ²	7.40 A.M. to	Sept. 15 . . .		4.45 A.M.
Apr. 13 . . .		10.00 A.M.	Sept. 17 . . .	.06	4.35 P.M. to
Apr. 16 . . .	3.89	6.54 A.M. to	Sept. 18 . . .		7.00 A.M.
Apr. 17 . . .	.19	11.00 A.M. to	Sept. 29 . . .	.30	5.30 P.M. to
Apr. 18 . . .		7.30 A.M.	Sept. 30 . . .		7.00 A.M.
Apr. 18 . . .	.03	7.00 P.M. to		1.40	
Apr. 19 . . .		3.00 A.M.			
Apr. 20 . . .	1.94	1.15 P.M. to	Oct. 1 . . .	2.22	11.45 P.M. to
Apr. 22 . . .		2.30 P.M.	Oct. 3 . . .		1.30 A.M.
Apr. 22 . . .	.47	9.00 A.M. to 9.45 P.M.	Oct. 7 . . .	.06	2.30 P.M. to 3.45 P.M.
Apr. 25 . . .	.83	7.10 A.M. to	Oct. 13 . . .	.04	5.30 A.M. to 11.00 A.M.
Apr. 28 . . .		12.30 A.M.	Oct. 16 . . .	.03	6.50 P.M. to
Apr. 29 . . .			Oct. 17 . . .		5.30 A.M.
	9.19		Oct. 22 . . .	.24	7.15 P.M. to
			Oct. 23 . . .		5.50 A.M.
May 2 . . .	.43	8.15 P.M. to	Oct. 31 . . .	.09	9.00 A.M. to
May 3 . . .		7.30 A.M.	Nov. 1 . . .		7.00 A.M.
May 5 . . .	.06	6.50 P.M. to 7.45 P.M.		2.68	
May 6 . . .	.48	6.50 P.M. to			
May 7 . . .		9.00 A.M.			
May 12 . . .	.10	5.10 P.M. to 11.00 P.M.			

¹ Snow.² Rain and snow.

TABLE No. 2. — *Rainfall in Inches at Chestnut Hill Reservoir, 1929*
— Concluded

DATE	Amount	Duration	DATE	Amount	Duration
Nov. 1 . .	} .03	10.00 A.M. to	Dec. 2 . .	.56 ¹	12.30 P.M. to 8.40 P.M.
Nov. 2 . .		6.00 A.M.	Dec. 7 . .	.17 ²	10.25 P.M. to
Nov. 2 . .	.91	10.20 P.M. to	Dec. 8 . .	} .06 ¹	3.30 P.M.
Nov. 4 . .	} .04	4.00 P.M.	Dec. 10 . .		8.45 P.M. to
Nov. 8 . .		6.40 P.M. to	Dec. 11 . .	} .04 ¹	4.30 A.M.
Nov. 9 . .	.11	5.00 A.M.	Dec. 12 . .		10.45 P.M. to
Nov. 13 . .	} .04	8.30 P.M. to	Dec. 13 . .	} .25	6.30 A.M.
Nov. 14 . .		4.30 A.M.	Dec. 13 . .		10.10 A.M. to
Nov. 14 . .	.20	9.00 P.M. to	Dec. 14 . .	} 1.77	7.00 A.M.
Nov. 15 . .	} 1.43	3.30 A.M.	Dec. 17 . .		10.00 A.M. to
Nov. 15 . .		9.50 A.M. to 3.00 P.M.	Dec. 20 . .	} .50 ²	6.00 A.M.
Nov. 17 . .		6.30 P.M. to	Dec. 23 . .		8.00 A.M. to
Nov. 18 . .	.11 ¹	6.30 P.M.	Dec. 24 . .	} .13	7.00 A.M.
Nov. 21 . .	} .08	6.45 A.M. to 1.00 P.M.	Dec. 28 . .		11.00 A.M. to 6.20 P.M.
Nov. 24 . .		7.30 P.M. to 11.00 P.M.	Dec. 29 . .	.36 ²	10.00 A.M. to 10.20 P.M.
Nov. 28 . .	.03	9.00 A.M. to 10.30 A.M.	Dec. 31 . .	.04 ²	1.00 A.M. to 2.30 A.M.
	2.98			3.88	

Total for year, 41.48 inches.
¹ Snow.
² Rain and snow.

TABLE No. 3. — *Wachusett System — Statistics of Flow of Water, Storage and Rainfall in 1929*
[Watershed above dam = 108.84 square miles.]

MONTH	GALLONS PER DAY										Rainfall Collected (Inches)	Percent- age of Rainfall Col- lected
	Taken by Town of Clinton	Taken by City of Worcester	Received from City of Worcester Watershed	Discharged into Wachusett Aqueduct ¹	Wasted into River below Dam	Seepage through the North Dike ²	STORAGE ³		Total Yield of Water- shed	Yield per Square Mile		
							Gain	Loss				
January .	—	—	—	110,265,000	1,806,000	900,000	17,587,000	—	130,558,000	1,200,000	4.80	44.5
February .	7,000	—	2,150,000	100,486,000	1,814,000	914,000	54,968,000	—	156,039,000	1,434,000	4.28	54.0
March .	—	—	23,871,000	85,135,000	12,252,000	968,000	225,210,000	—	299,694,000	2,754,000	3.40	144.5
April .	—	—	21,617,000	112,820,000	174,917,000	1,001,000	45,587,000	—	312,708,000	2,873,000	5.83	84.9
May .	—	—	15,277,000	122,151,000	139,232,000	1,000,000	—	12,100,000	235,006,000	2,159,000	4.62	83.3
June .	—	—	—	142,593,000	5,007,000	1,000,000	—	84,270,000	64,330,000	591,000	3.09	33.0
July .	20,000	—	—	171,455,000	1,774,000	971,000	—	158,068,000	16,152,000	148,000	0.85	31.2
August .	794,000	—	—	139,416,000	1,719,000	913,000	—	135,181,000	7,661,000	70,000	1.50	8.4
September .	905,000	—	—	145,145,000	1,688,000	865,000	—	131,500,000	17,103,000	157,000	2.00	13.6
October .	871,000	—	—	151,665,000	1,716,000	803,000	—	129,013,000	26,042,000	239,000	3.12	13.7
November .	807,000	—	—	113,116,000	1,703,000	760,000	—	76,633,000	39,753,000	365,000	3.14	20.1
December .	832,000	—	—	137,023,000	1,729,000	726,000	—	95,223,000	45,087,000	414,000	3.30	22.4
Total Av. for Yr.	355,000	—	5,264,000	127,824,000	28,795,000	902,000	—	40,448,000	112,164,000	1,031,000	39.93	54.2
		—					—				21.644	—

¹ Including 225,000 gallons per day drawn from aqueduct for the supply of the Westborough State Hospital.
² Estimated.
³ Aggregate storage in Wachusett Reservoir and in ponds and mill reservoirs.

TABLE No. 4. — *Sudbury System — Statistics of Flow of Water, Storage and Rainfall in 1929*
[Watershed=75.2 square miles.]

MONTH	GALLONS PER DAY										Rain-fall Collected (Inches)	Rain-fall Collected (Inches)	Percent- age of Rainfall Col- lected	
	Water received from Wachusett Reservoir ¹	Water discharged through Sudbury Aqueduct	Water discharged through Western Aqueduct	Water used by Fram- ingham Water Works	Water diverted from Water- shed by Sewers, etc.	Water wasted from Farm Pond	Water wasted into River below Lowest Dam	STORAGE		Total Yield of Watershed				Yield per Square Mile
								Gain	Loss					
Jan.	110,029,000	38,826,000	106,684,000	1,603,000	1,023,000	58,000	60,903,000	—	52,000	99,016,000	1,317,000	3.99	2.349	58.9
Feb.	100,243,000	34,707,000	105,914,000	1,568,000	925,000	307,000	71,072,000	—	646,000	113,604,000	1,511,000	3.84	2.434	63.3
Mar.	84,903,000	26,564,000	104,571,000	1,448,000	1,668,000	719,000	147,381,000	2,861,000	—	200,309,000	2,664,000	3.14	4.751	151.5
Apr.	112,600,000	23,680,000	103,828,000	1,285,000	1,889,000	—	179,683,000	23,429,000	—	221,194,000	2,941,000	7.30	5.070	69.4
May	121,923,000	35,245,000	99,800,000	1,400,000	1,939,000	929,000	124,861,000	—	7,393,000	134,858,000	1,793,000	3.65	3.199	87.6
June	142,333,000	43,326,000	94,780,000	1,803,000	1,037,000	—	14,570,000	—	30,000	17,153,000	228,000	1.65	0.394	23.9
July	171,203,000	59,252,000	90,481,000	1,871,000	734,000	—	4,752,000	5,771,000	—	-8,342,000	-111,000	0.90	-0.198	-21.9
Aug.	139,126,000	45,936,000	100,497,000	1,729,000	578,000	—	1,548,000	—	15,568,000	-4,406,000	-59,000	2.14	-0.105	-4.9
Sept.	144,928,000	40,384,000	102,704,000	1,601,000	533,000	—	1,501,000	—	3,672,000	-1,877,000	-25,000	2.11	-0.043	-2.1
Oct.	151,474,000	36,939,000	104,600,000	1,493,000	442,000	—	2,571,000	9,519,000	—	4,090,000	54,000	2.85	0.097	3.4
Nov.	112,943,000	31,113,000	104,980,000	1,390,000	383,000	—	7,097,000	—	12,903,000	19,117,000	254,000	2.97	0.439	14.8
Dec.	136,852,000	34,610,000	104,193,000	1,439,000	235,000	—	12,452,000	10,471,000	—	26,548,000	353,000	4.08	0.630	15.5
Total .	—	—	—	—	—	—	—	—	—	—	—	38.62	19.017	—
Av. for Yr. .	127,598,000	37,606,000	102,219,000	1,553,000	949,000	168,000	52,210,000	985,000	—	68,092,000	905,000	—	—	49.2

¹ Not including 225,000 gallons per day drawn from the Wachusett Aqueduct for the supply of the Westborough State Hospital, not discharged into Sudbury Reservoir.

TABLE No. 5. — *Cochituate System — Statistics of Flow of Water, Storage and Rainfall in 1929*
[Watershed of Lake = 17.58 square miles.¹]

MONTH	GALLONS PER DAY						Rainfall Collected (Inches)	Percent- age of Rainfall Collected	
	Water discharged through Cochituate Aqueduct	Water diverted from Water- shed by Sewers, etc.	Water wasted at Outlet of Lake	STORAGE		Total Yield of Water- shed			Yield per Square Mile
				Gain	Loss				
January	—	929,000	24,848,000	—	2,809,000	22,968,000	1,306,000	4.00	58.3
February	—	825,000	21,597,000	1,257,000	—	23,679,000	1,347,000	3.59	60.5
March	—	1,697,000	48,822,000	—	4,829,000	45,690,000	2,599,000	3.17	146.2
April	—	2,166,000	41,257,000	6,099,000	—	49,522,000	2,817,000	7.40	65.6
May	—	1,364,000	27,210,000	—	2,277,000	26,297,000	1,496,000	3.36	79.4
June	—	140,000	1,650,000	2,433,000	—	4,223,000	240,000	1.86	22.3
July	—	—239,000	—	—	77,000	—316,000	—18,000	0.93	—3.4
August	—	—249,000	—	—	303,000	—552,000	—31,000	1.93	—2.9
September	—	—123,000	—	—	237,000	—360,000	—20,000	1.21	—2.9
October	—	26,000	—	1,674,000	—	1,700,000	97,000	2.97	5.8
November	—	160,000	—	3,477,000	—	3,637,000	207,000	3.04	11.7
December	—	180,000	11,897,000	—	3,974,000	8,103,000	461,000	4.30	19.1
Total	—	—	—	—	—	—	—	37.76	—
Average for year	—	571,000	14,757,000	—	7,000	15,321,000	872,000	18.30	48.5

¹ Not including the watersheds of Dudley and Dug ponds.

TABLE NO. 6. — Sources from which and Periods during which Water has been drawn for the Supply of the Metropolitan Water District
From Wachusett Reservoir into the Wachusett Aqueduct

MONTH	Number of Days during which Water was Flowing	ACTUAL TIME		Million ¹ Gallons Drawn
		Hours	Minutes	
January	26	272	38	3,418.2
February	22	207	56	2,813.6
March	26	238	25	2,639.2
April	25	262	17	3,379.9
May	26	288	13	3,786.7
June	25	294	48	4,277.8
July	26	364	38	5,315.1
August	27	299	48	4,321.9
September	24	300	28	4,360.4
October	27	326	34	4,701.6
November	24	234	31	3,393.5
December	25	292	44	4,247.7
Totals	303	140.958 days		46,655.6

¹Including quantity supplied to Westborough State Hospital.

From Sudbury Reservoir through the Weston Aqueduct to Weston Reservoir

MONTH	Number of Days during which Water was Flowing	ACTUAL TIME		Million Gallons Drawn
		Hours	Minutes	
January	31	633	30	3,307.2
February	28	570	00	2,965.6
March	31	624	30	3,241.7
April	30	624	12	3,110.5
May	31	621	00	3,093.8
June	30	604	06	2,963.4
July	29	578	04	2,804.5 ¹
August	31	620	52	3,115.0 ²
September	30	611	00	3,085.4
October	31	633	03	3,242.6
November	30	609	23	3,149.4
December	31	634	00	3,230.0
Totals	363	306.81 days		37,309.1

¹ Including 733,800,000 gallons which were by-passed. Not including 400,000 gallons wasted into the Sudbury River on July 20.
² Not including 400,000 gallons wasted into the Sudbury River on August 23.

From Framingham Reservoir No. 3 through the Sudbury Aqueduct to Chestnut Hill Reservoir

MONTH	Number of Days during which Water was Flowing	Actual Time (Hours)	Million Gallons Drawn
January	31	744	1,203.6
February	28	672	971.8
March	31	744	823.5
April	30	719 ¹	709.4
May	31	744	1,092.6
June	30	720	1,299.8
July	31	744	1,836.8
August	31	744	1,424.0
September	30	721 ¹	1,213.2
October	31	744	1,145.1
November	30	720	933.4
December	31	744	1,072.9
Totals	365	365 days	13,726.1

¹ Change for daylight saving time.

TABLE No, 7. — *Average Daily Quantity of Water flowing through Aqueducts in 1929 by Months*¹

MONTH	Wachusett Aqueduct into Sudbury Reservoir (Gallons)	Weston Aqueduct into Metropolitan District (Gallons)	Sudbury Aqueduct into Chestnut Hill Reservoir (Gallons)	Cochituate Aqueduct into Chestnut Hill Reservoir (Gallons)
January	110,029,000	106,684,000	38,826,000	—
February	100,243,000	105,914,000	34,707,000	—
March	84,903,000	104,571,000	26,564,000	—
April	112,600,000	103,828,000	23,680,000	—
May	121,923,000	99,800,000	35,245,000	—
June	142,333,000	94,780,000	43,326,000	—
July	171,203,000	90,481,000	59,252,000	—
August	139,126,000	100,497,000	45,936,000	—
September	144,928,000	102,704,000	40,384,000	—
October	151,474,000	104,600,000	36,939,000	—
November	112,943,000	104,980,000	31,113,000	—
December	136,852,000	104,193,000	34,610,000	—
Average	127,598,000	102,219,000	37,606,000	—

¹ Not including quantities wasted while cleaning and repairing aqueducts.

TABLE No. 8.—(Meter Basis.) Average Daily Consumption of Water by Districts in the Cities and Towns supplied by the Metropolitan Water Works in 1929

MONTH	LOW SERVICE	SOUTHERN HIGH SERVICE	SOUTHERN INTERMEDIATE HIGH SERVICE	NORTHERN HIGH SERVICE	SOUTHERN EXTRA HIGH SERVICE	NORTHERN EXTRA HIGH SERVICE	Total District Supplied (Gallons)	Estimated Population	Consumption per Inhabitant (Gallons)
	Portions of Arlington, Belmont, Boston, Chelsea, Everett, Malden, Medford, Somerville and Watertown (Gallons)	Quincy and Portions of Boston, Milton and Watertown (Gallons)	Portions of Belmont and Watertown (Gallons)	Melrose, Nahant, Revere, Stoneham, Swampscott and Winthrop and Portions of Boston, Chelsea, Everett, Malden, Medford and Somerville (Gallons)	Portions of Boston and Milton (Gallons)	Lexington and Portions of Arlington and Belmont (Gallons)			
January	75,265,400	47,975,300	1,284,300	11,611,200	1,368,900	1,475,000	138,980,100	1,372,280	101
February	74,004,000	47,656,500	1,225,700	11,496,400	1,405,900	1,468,600	137,257,100	1,373,820	100
March	70,475,300	46,029,000	1,264,800	11,440,100	1,391,800	1,375,200	131,976,200	1,375,360	96
April	68,916,100	45,608,500	1,268,000	11,355,500	1,395,000	1,408,700	129,951,800	1,376,900	94
May	70,835,900	46,890,000	1,392,000	11,722,800	1,482,400	1,622,700	133,945,800	1,378,440	97
June	74,367,400	48,858,300	1,593,500	13,615,500	1,694,200	1,936,800	142,065,700	1,379,980	103
July	74,684,200	49,748,200	1,731,800	14,833,300	1,729,000	2,215,700	144,942,200	1,381,520	105
August	73,803,800	48,022,500	1,542,000	13,539,300	1,641,700	1,840,200	140,389,500	1,383,060	102
September	74,182,400	48,594,600	1,540,700	13,217,200	1,600,100	1,726,000	140,861,000	1,384,600	102
October	72,687,100	46,754,500	1,418,900	12,074,600	1,488,300	1,509,700	135,933,100	1,386,140	98
November	71,122,100	45,432,700	1,376,700	11,562,100	1,444,700	1,483,100	132,421,400	1,387,680	95
December	72,669,300	47,073,000	1,309,700	11,859,900	1,406,700	1,417,000	135,735,600	1,389,220	98
For the year	72,747,400	47,387,600	1,413,600	12,366,900	1,504,500	1,624,300	137,044,300	1,381,520	99

TABLE No. 9. — (Meter Basis.) Average Daily Consumption of Water in Cities and Towns supplied by the Metropolitan Water Works in 1929

City or town	ARLINGTON	BELMONT	BOSTON	CHELSEA	EVERETT	LEXINGTON	MALDEN
Population	28,650	17,890	814,620	49,490	43,230	8,610	53,580
MONTH	GALLONS		GALLONS		GALLONS		GALLONS
	Per Day	Per Capita	Per Day	Per Capita	Per Day	Per Capita	
January	1,689,700	60	97,170,500	120	5,040,300	664,900	3,684,500
February	1,666,300	59	95,771,600	118	5,067,000	664,900	3,640,000
March	1,662,000	59	91,004,500	112	4,921,900	570,500	3,573,800
April	1,700,100	60	89,487,900	110	4,763,300	548,800	3,497,000
May	1,859,100	65	91,916,200	113	4,928,500	634,900	3,534,800
June	2,253,500	79	95,675,000	118	4,924,800	767,900	3,823,800
July	2,460,400	86	96,260,400	118	5,036,900	887,700	3,944,800
August	1,999,300	70	94,960,800	116	5,183,400	739,600	3,690,500
September	1,955,000	68	95,389,200	117	5,669,100	662,700	3,936,900
October	1,719,000	60	92,968,500	114	5,315,400	600,400	3,806,500
November	1,711,200	59	91,341,700	112	4,754,600	597,300	3,662,200
December	1,677,400	58	94,115,500	115	4,968,800	537,900	3,515,500
For the year	1,863,900	65	93,832,100	115	5,066,600	656,500	3,692,600
				73	117	76	69

TABLE No. 9. — (Meter Basis.) Average Daily Consumption of Water in Cities and Towns, etc.—Continued

City or town	MEDFORD		MELROSE		MILTON		NAHANT		QUINCY		REVERE	
	Per Day	Per Capita	Per Day	Per Capita	Per Day	Per Capita	Per Day	Per Capita	Per Day	Per Capita	Per Day	Per Capita
Population	53,610		21,650		14,610		1,770		68,130		36,540	
	GALLONS		GALLONS		GALLONS		GALLONS		GALLONS		GALLONS	
MONTH												
January	3,021,900	57	1,468,800	68	759,400	53	115,400	66	5,335,000	79	2,111,800	58
February	3,068,500	58	1,434,700	67	757,500	52	121,700	70	5,366,400	80	2,100,400	58
March	3,158,100	59	1,441,100	67	790,200	55	126,600	72	5,328,000	79	2,084,000	57
April	3,149,700	59	1,413,000	66	778,700	54	118,600	67	5,432,100	80	2,012,400	55
May	3,435,000	64	1,427,000	66	818,290	56	146,300	83	5,435,700	80	2,058,900	57
June	3,782,700	71	1,626,400	75	961,900	66	361,300	204	5,814,700	86	2,460,400	67
July	3,669,600	68	1,753,800	81	946,800	65	408,800	231	6,147,800	90	2,819,800	77
August	3,418,100	64	1,473,200	68	868,100	59	326,900	185	5,750,600	84	2,628,800	72
September	3,382,100	63	1,508,300	69	880,200	60	251,300	142	5,788,000	85	2,395,200	65
October	3,251,800	60	1,474,100	68	819,700	56	165,500	93	5,559,600	81	2,111,400	57
November	3,225,000	60	1,470,100	68	788,600	54	121,400	68	5,604,800	82	1,956,000	53
December	3,329,200	61	1,529,000	70	785,800	53	225,100	126	5,581,500	81	2,057,000	56
For the year	3,325,700	62	1,502,200	69	829,900	57	208,000	118	5,596,500	82	2,234,400	61

TABLE No. 9. — (Meter Basis.) Average Daily Consumption of Water in Cities and Towns, etc. — Concluded

City or town	SOMERVILLE				STONEHAM				SWAMPSCOTT				WATERTOWN				WINTHROP				METROPOLITAN DISTRICT			
	MONTH				GALLONS				GALLONS				GALLONS				GALLONS				GALLONS			
	Per Day	Per Capita			Per Day	Per Capita			Per Day	Per Capita			Per Day	Per Capita			Per Day	Per Capita			Per Day	Per Capita		
Population	103,860				9,830				9,480				28,330				17,640				1,381,520			
January	8,780,100	85	.	.	648,100	67	.	.	521,300	55	.	.	2,174,200	78	.	.	1,009,300	58	.	.	138,980,100	101	.	.
February	8,602,500	83	.	.	673,000	69	.	.	519,500	55	.	.	2,101,100	75	.	.	996,100	57	.	.	137,257,100	100	.	.
March	8,236,400	80	.	.	665,200	68	.	.	511,700	54	.	.	2,139,600	76	.	.	1,035,600	59	.	.	131,976,200	96	.	.
April	8,186,800	79	.	.	637,600	65	.	.	544,300	57	.	.	2,081,200	74	.	.	1,030,300	59	.	.	129,951,800	94	.	.
May	8,463,500	82	.	.	596,100	61	.	.	671,400	71	.	.	2,224,500	79	.	.	1,066,200	61	.	.	133,945,800	97	.	.
June	9,135,500	88	.	.	671,400	68	.	.	1,015,500	107	.	.	2,366,500	84	.	.	1,243,500	71	.	.	142,065,700	103	.	.
July	9,129,700	88	.	.	756,200	77	.	.	1,185,700	125	.	.	2,519,800	89	.	.	1,530,200	87	.	.	144,942,200	105	.	.
August	8,676,900	83	.	.	682,700	69	.	.	1,023,100	108	.	.	2,286,300	81	.	.	1,444,900	82	.	.	140,389,500	102	.	.
September	8,744,400	84	.	.	666,700	68	.	.	964,300	102	.	.	2,310,800	81	.	.	1,252,700	71	.	.	140,861,000	102	.	.
October	8,450,400	81	.	.	662,400	67	.	.	764,600	80	.	.	2,229,100	78	.	.	1,114,000	63	.	.	135,933,100	98	.	.
November	8,147,800	78	.	.	656,500	66	.	.	569,100	60	.	.	2,109,100	74	.	.	1,073,200	60	.	.	132,421,400	95	.	.
December	8,423,600	81	.	.	689,200	70	.	.	554,500	58	.	.	2,046,500	72	.	.	1,083,400	61	.	.	135,735,600	98	.	.
For the year	8,581,600	83	.	.	667,100	68	.	.	738,500	78	.	.	2,216,700	78	.	.	1,158,000	66	.	.	137,044,300	99	.	.

TABLE No. 10. — Chemical Examinations of Water from the Wachusett Reservoir, Clinton
[Parts per 100,000]

DATE OF COLLECTION.	APPEARANCE		ODOR		RESIDUE ON EVAPO- RATION		AMMONIA			Chlorine	Hardness	
	Turbidity	Sediment	Cold	Hot	Total	Loss on Ignition	Free	ALBUMINOID				
								Total.	Dissolved			Suspended
Jan. 2 .	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	3.75	1.50	.0008	.0074	.0060	.0014	.25	1.3
Jan. 22 .	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	3.95	1.65	.0004	.0078	.0052	.0026	.26	1.3
Feb. 5 .	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	3.90	1.55	.0012	.0122	.0114	.0008	.27	0.8
Feb. 19 .	V. slight.	V. slight.	V. faintly vegetable.	V. faintly vegetable.	4.15	1.70	.0010	.0384	.0060	.0024	.28	1.3
Mar. 5 .	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	4.25	1.70	.0010	.0068	.0060	.0008	.26	0.8
Mar. 19 .	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	4.05	1.70	.0006	.0074	.0060	.0014	.26	1.7
Apr. 2 .	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	3.65	1.45	.0004	.0074	.0058	.0016	.25	1.3
Apr. 16 .	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	3.55	1.25	.0008	.0116	.0094	.0022	.22	0.8
May 17 .	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	3.15	1.20	.0012	.0132	.0088	.0044	.22	1.3
May 21 .	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	3.45	1.40	.0008	.0098	.0086	.0012	.23	1.3
June 4 .	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	3.60	1.35	.0014	.0114	.0106	.0008	.24	1.3
June 18 .	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	3.20	1.10	.0012	.0104	.0082	.0022	.24	0.8
July 9 .	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	3.65	1.40	.0052	.0294	.0146	.0148	.32	0.8
July 23 .	V. slight.	V. slight.	Faintly vegetable and unpl.	Distinctly veg. and unpl.	3.80	1.85	.0018	.0110	.0094	.0016	.25	0.8
Aug. 6 .	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	3.55	1.70	.0014	.0108	.0096	.0012	.25	0.8
Aug. 20 .	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	3.50	1.25	.0028	.0382	.0072	.0010	.29	0.8
Sept. 3 .	Slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	3.25	1.50	.0014	.0122	.0106	.0016	.22	0.8
Sept. 17 .	Slight.	Slight.	Faintly vegetable.	Distinctly vegetable.	3.05	1.05	.0008	.0084	.0072	.0012	.26	0.8
Oct. 8 .	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	4.25	1.65	.0016	.0114	.0078	.0036	.24	1.3
Oct. 22 .	V. slight.	V. slight.	V. faintly vegetable.	V. faintly vegetable.	3.05	1.30	.0018	.0072	.0058	.0014	.24	1.3
Nov. 5 .	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	3.70	1.20	.0018	.0110	.0084	.0026	.26	1.3
Dec. 3 .	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	3.30	1.50	.0018	.0078	.0058	.0020	.26	1.3
Dec. 17 .	Slight.	Slight.	V. faintly vegetable.	Faintly vegetable.	3.45	1.50	.0008	.0068	.0048	.0020	.24	2.0
Average .					3.61	1.45	.0014	.0103	.0080	.0023	.25	1.1

TABLE No. 11. — *Chemical Examinations of Water from the Sudbury Reservoir.*
[Parts per 100,000]

DATE OF COLLECTION	APPEARANCE		ODOR		RESIDUE on EVAPORATION		AMMONIA				Chlorine	Hardness
	Turbidity	Sediment	Cold	Hot	Total	Loss on Ignition	Free	ALBUMINOID				
								Total	Dissolved	Suspended		
Jan. 2	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	3.75	1.50	.0002	.0112	.0092	.0020	.26	1.3
Feb. 5	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	3.95	1.65	.0018	.0154	.0104	.0050	.30	1.3
Mar. 5	V. slight.	V. slight.	V. faintly vegetable.	V. faintly vegetable.	4.10	1.70	.0038	.0102	.0082	.0020	.28	1.3
Apr. 2	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	3.70	1.50	.0006	.0124	.0084	.0040	.26	1.3
May 7	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	3.60	1.40	.0010	.0146	.0096	.0050	.29	1.7
June 4	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	4.20	1.65	.0006	.0134	.0082	.0052	.31	1.7
July 8	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	3.85	1.65	.0004	.0140	.0104	.0036	.26	1.7
Aug. 13	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	3.75	1.30	.0002	.0110	.0062	.0048	.28	0.8
Sept. 3	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	4.00	1.50	.0006	.0144	.0116	.0028	.28	0.8
Oct. 8	V. slight.	V. slight.	Faintly vegetable.	Distinctly vegetable.	3.00	1.25	.0022	.0110	.0070	.0040	.25	1.3
Nov. 5	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	4.55	1.75	.0006	.0088	.0078	.0010	.28	1.3
Dec. 3	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	3.60	1.70	.0006	.0104	.0070	.0034	.28	1.3
Average					3.84	1.55	.0011	.0122	.0086	.0036	.28	1.3

TABLE No. 12 — *Chemical Examinations of Water from Spot Pond, Stoneham.*
[Parts per 100,000]

7	.	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	4.35	1.90	.0006	.0102	.0098	.0004	.32	1.3
Jan.	.	V. slight.	V. slight.	V. faintly vegetable.	V. faintly vegetable.	4.45	1.80	.0002	.0084	.0066	.0018	.31	1.7
Feb.	.	V. slight.	V. slight.	V. faintly vegetable.	V. faintly vegetable.	4.05	1.65	.0004	.0086	.0068	.0018	.29	1.3
Mar.	4	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	4.65	2.00	.0006	.0072	.0058	.0014	.30	1.6
Apr.	1	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	4.15	1.40	.0016	.0118	.0092	.0026	.32	1.3
May	6	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	3.80	1.10	.0018	.0106	.0078	.0028	.32	1.6
June	3	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	5.00	2.15	.0022	.0130	.0116	.0014	.32	1.3
July	8	V. slight.	Cons. sand	V. faintly vegetable.	V. faintly vegetable.	3.65	1.35	.0008	.0110	.0098	.0012	.29	0.8
Aug.	5	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	4.00	1.35	.0008	.0122	.0096	.0026	.30	1.0
Sept.	3	V. slight.	V. slight.	Faintly vegetable.	Distinctly vegetable.	4.25	1.80	.0022	.0134	.0094	.0040	.29	1.7
Oct.	7	V. sl. sand	Sl. sand	Faintly vegetable.	Faintly vegetable.	3.80	1.30	.0022	.0094	.0084	.0010	.30	1.3
Nov.	4	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	4.30	1.75	.0006	.0074	.0066	.0008	.27	1.3
Dec.	2	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.								
Average	.	.	.	.	.	4.20	1.63	.0012	.0103	.0085	.0018	.30	1.4

TABLE No. 13. — Chemical Examinations of Water from Lake Cochituate

[Parts per 100,000]

DATE OF COLLECTION	APPEARANCE		Odor		RESIDUE ON EVAPO- RATION		AMMONIA			Chlorine	Hardness	
	Turbidity	Sediment	Cold	Hot	Total	Loss on Ignition	Free	ALBUMINOID				
								Total	Dissolved			Suspended
Jan. 2	V. slight.	Slight.	V. faintly vegetable.	Faintly vegetable.	7.80	3.00	.0046	.0154	.0122	.0032	.86	3.0
Feb. 6	V. slight.	V. slight.	V. faintly vegetable.	V. faintly vegetable.	7.10	2.45	.0100	.0190	.0110	.0080	.86	3.0
Mar. 6	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	7.25	2.60	.0118	.0150	.0116	.0034	.88	3.3
Apr. 3	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	8.00	2.45	.0128	.0160	.0132	.0028	.86	3.0
May 8	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	3.30	2.10	.0086	.0150	.0118	.0032	.81	2.6
June 4	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	6.80	1.65	.0010	.0162	.0126	.0036	.80	3.0
July 9	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	7.30	2.20	.0006	.0146	.0128	.0018	.83	3.0
Aug. 8	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	7.30	2.20	.0012	.0156	.0112	.0044	.86	2.6
Sept. 4	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	7.90	2.70	.0014	.0174	.0124	.0050	.86	2.6
Oct. 9	V. slight.	Slight.	Faintly vegetable.	Faintly vegetable.	6.85	2.10	.0022	.0164	.0138	.0026	.82	3.0
Nov. 6	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	8.05	2.45	.0056	.0180	.0166	.0014	.88	3.0
Dec. 4	Slight.	Slight.	V. faintly vegetable.	Faintly vegetable.	7.20	2.45	.0038	.0124	.0104	.0020	.84	3.0
Average					7.49	2.36	.0053	.0159	.0125	.0034	.85	2.9

TABLE No. 14. — Chemical Examinations of Water from a Tap at the State House, Boston

[Parts per 100,000.]

Jan. 4	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	4.40	1.85	.0008	.0108	.0092	.0016	.32	1.3
Feb. 4	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	4.45	1.85	.0006	.0098	.0074	.0024	.32	1.3
Mar. 4	V. slight.	V. slight.	V. faintly vegetable.	V. faintly vegetable.	4.30	1.85	.0006	.0102	.0062	.0040	.33	1.3
Apr. 1	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	4.95	2.10	.0006	.0088	.0072	.0016	.30	1.3
May 6	V. slight.	Slight.	V. faintly vegetable.	Faintly vegetable.	4.05	1.30	.0004	.0150	.0088	.0062	.32	1.6
June 3	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	4.35	1.75	.0008	.0100	.0072	.0028	.29	1.6
Aug. 8	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	4.50	1.80	.0014	.0104	.0076	.0028	.30	1.1
Oct. 7	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	3.70	1.50	.0004	.0098	.0060	.0038	.27	1.3
Nov. 4	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	4.40	1.80	.0008	.0104	.0086	.0018	.28	1.3
Dec. 3	V. slight.	V. slight.	Faintly vegetable.	Distinctly vegetable.	3.50	1.25	.0008	.0110	.0062	.0048	.25	0.8
Average					4.26	1.71	.0007	.0106	.0074	.0032	.30	1.3

TABLE NO. 15. — *Chemical Examinations of Water from a Faucet in Boston, 1898-1929*
[Parts per 100,000]

YEAR	COLOR	RESIDUE ON EVAPORATION		AMMONIA				Chlorine	Oxygen Consumed	Hardness
	Platinum Standard	Total	Loss on Ignition	Free	ALBUMINOID					
					Total	Dissolved	Suspended			
1898	40	4.19	1.60	.0008	.0152	.0136	.0016	.29	.44	1.4
1899	28	3.70	1.30	.0006	.0136	.0122	.0014	.24	.35	1.1
1900	29	3.80	1.20	.0012	.0157	.0139	.0018	.25	.38	1.3
1901	29	4.43	1.64	.0013	.0158	.0142	.0016	.30	.42	1.7
1902	30	3.93	1.56	.0016	.0139	.0119	.0020	.29	.40	1.3
1903	29	3.98	1.50	.0013	.0125	.0110	.0015	.30	.39	1.5
1904	23	3.93	1.59	.0023	.0139	.0121	.0018	.34	.37	1.5
1905	24	3.86	1.59	.0020	.0145	.0124	.0021	.35	.35	1.4
1906	24	3.86	1.39	.0018	.0159	.0134	.0025	.34	.36	1.3
1907	22	3.83	1.40	.0013	.0129	.0109	.0020	.33	.32	1.3
1908	19	3.50	1.35	.0011	.0115	.0092	.0024	.33	.26	1.2
1909	18	3.46	1.43	.0011	.0128	.0103	.0025	.28	.25	1.3
1910	14	3.05	1.24	.0013	.0118	.0102	.0016	.28	.22	1.1
1911	25	4.18	1.66	.0015	.0156	.0128	.0029	.38	.33	1.4
1912	17	3.86	1.23	.0018	.0154	.0119	.0034	.36	.29	1.7
1913	13	3.96	1.15	.0014	.0150	.0120	.0026	.35	.26	1.5
1914	14	4.12	1.19	.0014	.0138	.0116	.0022	.39	.25	1.4
1915	16	3.73	1.04	.0015	.0157	.0134	.0023	.38	.25	1.4
1916	18	4.53	1.85	.0013	.0133	.0107	.0026	.36	-	1.4
1917	15	4.45	1.68	.0015	.0142	.0124	.0018	.33	-	1.3
1918	18	3.89	1.45	.0019	.0154	.0128	.0026	.29	-	1.4
1919	20	4.28	1.41	.0010	.0130	.0108	.0022	.36	-	1.5
1920	17	4.23	1.35	.0012	.0112	.0097	.0014	.33	-	1.5
1921	13	3.80	1.39	.0006	.0104	.0089	.0015	.25	-	1.4
1922	16	3.98	1.55	.0011	.0097	.0080	.0017	.30	-	1.8
1923	15	3.90	1.45	.0011	.0100	.0090	.0010	.26	-	1.5
1924	12	4.10	1.60	.0011	.0109	.0084	.0025	.28	-	1.5
1925	09	3.98	1.62	.0013	.0109	.0093	.0016	.29	-	1.5
1926	10	4.18	1.68	.0015	.0115	.0092	.0023	.32	-	1.5
1927	22	4.47	1.62	.0013	.0111	.0101	.0018	.34	-	1.9
1928	27	4.43	1.72	.0011	.0124	.0106	.0018	.37	-	1.5
1929	17	4.26	1.71	.0007	.0106	.0074	.0032	.30	-	1.3

TABLE NO. 16. — *Number of Bacteria per Cubic Centimeter in Water from Various Parts of the Metropolitan Water Works, 1898-1929. (Averages of Weekly Determinations.)*

YEAR	CHESTNUT HILL RESERVOIR			SOUTHERN SERVICE TAPS	
	Sudbury Aqueduct Terminal Chamber	Cochituate Aqueduct	Effluent Gate-house No. 2	Low Service, 182 Boylston Street	High Service, 1 Ashburton Place
1898	207	145	111	96	-
1899	224	104	217	117	123
1900	248	113	256	188	181
1901	225	149	169	162	168
1902	203	168	121	164	246
1903	76	120	96	126	243
1904	347	172	220	176	355
1905	495	396	489	231	442
1906	231	145	246	154	261
1907	147	246	118	130	176
1908	162	138	137	136	148
1909	198	229	119	150	195
1910	216	-	180	178	213
1911	205	204	151	175	197
1912	429	450	227	249	259
1913	123	243	157	119	140
1914	288	-	252	174	220
1915	163	-	128	117	134
1916	128	-	85	102	105
1917	178	112	119	119	141
1918	1,163	168	705	317	544
1919	92	85	100	70	84
1920	148	86	108	113	112
1921	103	-	83	92	92
1922	163	-	153	160	172
1923	229	-	178	217	230
1924	137	-	96	150	160
1925	144	251	120	155	174
1926	167	-	118	130	137
1927	119	185	70	81	101
1928	144	32	86	106	106
1929	128	-	84	130	144

TABLE No. 17. — Colors of Water from Various Parts of the Metropolitan Water Works in 1929. (Averages of Weekly Determinations.)

[Platinum Standard]

MONTH	WACHUSETT RESERVOIR						SUDBURY RESERVOIR			FRAM- INGHAM RESER- VOIR No. 3	LAKE COCHITUATE			CHESTNUT HILL RESERVOIR			SPOT POND	FELS RESER- VOIR	NORTHERN SERVICE		SOUTHERN SERVICE	
	Surface	Mid-depth	Bottom	Worcester St. Bridge	Quinapoxet River	Stillwater River	Surface	Mid-depth	Bottom		Surface	Mid-depth	Bottom	Inlet (Sudbury Aqueduct)	Inlet (Cochituate Aqueduct)	Effluent Gate-house No. 2			Tap at Glenwood Yard, Medford (Low Service)	Tap at Glenwood Yard, Medford (High Service)	Tap at 182 Boylston Street, Boston (Low Service)	Tap at 1 Ashburton Place, Boston (High Service)
January .	21	21	21	31	55	35	25	23	24	24	25	32	33	23	24	22	-	16	23	16	23	22
February .	21	21	21	38	62	29	25	24	24	24	27	32	33	24	24	22	16	16	22	22	22	22
March .	21	21	22	51	51	31	27	24	26	27	28	32	33	23	24	21	16	16	23	23	22	22
April .	21	21	21	37	57	35	25	24	26	27	28	32	33	23	24	21	16	16	22	22	22	22
May .	25	21	21	48	87	47	28	28	28	29	26	26	29	26	26	23	17	16	22	22	22	22
June .	22	23	23	27	84	47	27	23	23	23	23	23	29	28	26	25	18	17	26	26	26	26
July .	20	21	21	27	41	33	21	21	22	21	23	23	61	28	28	25	18	18	27	27	27	27
August .	19	19	20	31	62	25	19	19	20	20	16	21	105	22	22	21	15	15	21	21	21	21
September .	18	17	20	19	93	22	18	18	19	19	16	21	159	18	20	19	15	15	19	19	19	19
October .	18	19	19	22	91	23	18	19	19	19	18	20	129	18	18	17	15	15	18	18	18	18
November .	17	17	17	23	69	24	18	18	18	18	21	20	43	18	17	15	15	18	18	18	18	18
December .	16	16	17	45	37	16	18	18	18	17	20	20	21	17	17	16	14	14	17	17	17	17
Mean .	20	20	21	33	66	31	22	22	23	74	23	23	74	22	17	20	16	16	21	16	21	21

TABLE No. 18. — *Temperatures of Water from Various Parts of the Metropolitan Water Works in 1929. (Averages of Weekly Determinations.)*

[The temperatures are taken at the same places and times as the samples for microscopical examination; the depth at place of observation is from high-water mark.]
[Degrees Fahrenheit.]

MONTH	WACHUSETT ¹ RESERVOIR (DEPTH AT PLACE OF OBSERVATION 107 FEET)			SUDBURY ¹ RESERVOIR (DEPTH AT PLACE OF OBSERVATION 54.5 FEET)			WACHU- SETT AQUE- DUCT			FRAMINGHAM ¹ RESERVOIR No. 3 (DEPTH AT PLACE OF OBSERVATION 20.5 FEET)			LAKE COCHITUATE ¹ (DEPTH AT PLACE OF OBSERVATION 62.0 FEET)			CHEST- NUT HILL RESER- VOIR			SPOT POND ¹ (DEPTH AT PLACE OF OBSERVATION 28.0 FEET)			NORTHERN SERVICE		SOUTHERN SERVICE	
	Surface	Mid-depth	Bottom	Surface	Mid-depth	Bottom	End of Open Channel			Surface	Mid-depth	Bottom	Surface	Mid-depth	Bottom	Surface	Mid-depth	Bottom	Surface	Mid-depth	Bottom	Tap at Glenwood Yard, Medford (Low Ser- vice)	Tap at Glenwood Yard, Medford (High Ser- vice)	Tap at 182 Boylston Street, Boston (Low Service)	Tap at 1 Ashburton Place, Boston (High Service)
January	33.4	38.6	35.7	34.7	36.0	36.2	33.3	33.8	33.3	34.3	35.3	34.9	32.3	—	—	35.3	36.3	35.2	35.2	35.0	—	39.2	40.9	39.9	39.8
February	33.9	35.2	35.1	34.0	36.0	36.3	33.8	33.8	36.1	35.0	36.1	36.1	34.7	—	—	36.3	36.3	34.3	34.3	35.5	—	36.8	39.8	39.3	39.4
March	35.5	34.2	36.6	36.1	37.3	37.5	36.0	36.0	39.4	38.6	39.0	39.4	45.1	38.7	38.6	38.0	38.0	37.8	37.8	36.0	35.5	38.9	41.0	40.1	40.5
April	40.7	40.1	40.7	45.1	44.5	45.3	41.1	41.1	46.3	46.3	45.5	46.3	45.1	43.9	43.7	45.4	45.4	44.6	44.6	44.5	44.0	46.6	46.4	47.4	58.1
May	52.5	52.9	49.1	57.4	55.0	56.0	51.1	51.1	56.2	56.2	60.0	55.0	56.9	53.9	51.1	57.6	45.4	56.1	56.1	56.5	54.8	56.1	57.9	58.3	58.3
June	68.5	59.1	56.2	70.9	63.2	59.5	53.8	53.8	74.1	72.3	66.6	65.5	71.8	57.7	52.9	57.6	58.9	66.7	66.7	67.8	60.0	66.8	68.1	68.1	68.8
July	73.5	65.3	60.5	73.5	70.0	67.3	58.2	58.2	74.0	74.1	71.8	70.6	74.6	59.7	55.5	72.7	68.9	72.1	72.1	71.3	67.3	71.2	72.2	72.7	72.7
August	69.7	67.1	60.5	70.5	69.3	69.0	61.8	61.8	70.9	69.8	68.6	66.8	67.7	58.6	53.5	71.3	67.7	71.3	71.3	71.0	70.0	68.4	69.3	71.4	71.9
September	66.8	67.7	61.7	66.8	66.5	67.5	63.0	63.0	67.6	68.6	66.8	66.8	67.7	58.6	53.5	67.7	68.8	67.8	67.8	68.5	44.8	68.8	69.1	69.9	69.9
October	56.6	56.6	55.7	56.9	56.3	57.2	55.8	55.8	55.5	55.4	55.1	55.1	48.8	55.6	52.4	57.1	60.7	60.7	57.1	57.7	56.0	61.5	60.6	61.3	61.3
November	49.2	48.1	50.7	48.1	49.8	46.5	47.8	47.8	46.2	44.4	48.6	48.6	48.8	49.0	48.6	47.8	47.8	47.7	47.7	46.3	50.0	51.9	51.7	52.2	52.2
December	37.0	36.5	38.2	36.0	36.8	38.0	36.5	36.5	35.9	36.0	35.8	35.8	36.8	37.6	37.3	35.6	35.6	33.2	33.2	—	37.5	40.2	39.7	39.9	39.9
Mean	51.4	50.1	48.3	52.5	51.7	51.4	47.7	47.7	52.7	52.4	52.2	52.2	52.8	51.4	48.7	52.8	52.0	52.0	55.5	55.5	50.7	54.1	54.0	54.8	56.1

¹ Surface temperatures are averages of weekly determinations. Mid-depth and bottom temperatures are averages of biweekly determinations.

TABLE No. 19. — Length of Metropolitan Water Works Main Lines and Connections and Number of Valves set in Same, Dec. 31, 1929

[Pipes are of cast iron unless otherwise noted.]

DIAMETER OF PIPES IN INCHES																			
60	56	54	48	42	40	38	36	30	24	20	16	14	12	10	8	6	4	Total	
Total length owned and operated Dec. 31, 1928 (feet)	81,337	17,569	215,562	9,810	6,887	7,274	63,958	63,180	96,075	102,369	76,548	26	29,539	3,867	1,900	1,282	46	790,715	
Gate valves in same	12	—	57	1	3	—	69	49	68	64	116	1	135	22	23	25	2	652	
Air valves in same	110	8	127	5	5	6	48	34	55	66	41	—	10	1	—	—	—	528	
Length laid or relaid during 1929 (feet)	4,665	—	2,161	1,059	—	—	58	14,759	252	160	123	—	69	—	20	21	14	23,361	
Gate valves in same	3	—	2	2	—	—	2	1	1	—	6	—	5	—	2	1	—	25	
Air valves in same	6	—	6	1	—	—	—	12	2	1	—	—	—	—	—	—	—	28	
Length abandoned during 1929 (feet)	—	—	74	—	—	—	—	—	250	160	54	—	27	—	8	23	—	596	
Gate valves in same	—	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—	2	
Air valves in same	—	—	1	—	—	—	—	—	2	1	—	—	—	—	—	—	—	4	
Length owned and operated Dec. 31, 1929 (feet)	86,002 ¹	17,569 ²	217,649 ³	10,869 ⁴	6,887	7,274 ²	64,016 ⁵	77,939 ⁶	96,077 ⁷	102,369 ⁸	76,617 ⁹	26	29,581 ¹⁰	3,867	1,912	1,280	60	813,480 ¹¹	
Gate valves in same	15	—	59	3	3	—	71	50	69	64	120	1	140	22	25	26	2	675	
Air valves in same	116	8	132	6	5	6	48	46	55	66	41	—	10	1	—	—	—	552	

¹ Includes 2,035 feet of 76-inch concrete-lined pressure tunnel; 363 feet of 76-inch mortar-lined and concrete-covered steel pipe; 21 feet of 76-inch cast-iron pipe; 85 feet of 60-inch concrete-covered steel pipe, and 38,680 feet of 60-inch steel pipe.

² Steel pipe.

³ Includes 2,087 feet of steel pipe.

⁴ Includes 1,059 feet of steel pipe.

⁵ Includes 22 feet of steel pipe.

⁶ Includes 13,512 feet of mortar-lined and covered wrought-iron pipe; 7,213 feet of cement-lined cast-iron pipe, and 18,997 feet of steel pipe.

⁷ Includes 90 feet of steel pipe.

⁸ Includes 1,319 feet of cement-lined cast-iron pipe.

⁹ Includes 1,795 feet of cement-lined cast-iron pipe.

¹⁰ Includes 627 feet of cement-lined cast-iron pipe.

¹¹ 154.07 miles.

TABLE No. 20. — *Length of Metropolitan Water Works Hydrant, Blow-off and Drain Pipes, Dec. 31, 1929*

[All pipes are of cast iron.]

	DIAMETER OF PIPES IN INCHES								Total
	24	20	16	12	10	8	6	4	
Total length in use Dec. 31, 1928 (feet)	352	292	3,638	7,074	220	1,126	4,160	1,640	18,502
Valves in same	—	—	44	114	2	14	99	48	321
Length laid or relaid in 1929 (feet)	—	—	63	25	—	188	—	—	276
Valves in same	—	—	3	2	—	6	—	—	11
Length abandoned in 1929 (feet)	—	—	—	—	—	—	—	—	—
Valves in same	—	—	—	—	—	—	—	—	—
Total length in use Dec. 31, 1929 (feet)	352	292	3,701	7,099	220	1,314	4,160	1,640	18,778 ¹
Valves in same	—	—	47	116	2	20	99	48	332

¹ 3.56 miles.

TABLE No. 21. — Length of Metropolitan Water Works Main Lines and Connections and Water Pipes, Four Inches in Diameter and Larger, in the Several Cities and Towns in the Metropolitan Water District, Dec. 31, 1929

By Whom Owned	INCHES														TOTALS							
	60	56	54	48	42	40	38	36	30	24	20	18	16	14	12	10	8	7	6	4	Feet	Miles
Met. Water Wks.	86,002	17,569	13,486	217,649	10,869	6,887	7,274	64,016	77,939	96,077	102,369	-	76,617	26	29,581	3,867	1,912	-	1,280	60	813,480	154.07
Arlington	-	-	-	-	-	-	-	-	-	-	-	-	-	-	37,918	32,930	58,406	-	250,405	15,434	395,093	74.83
Belmont	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11,397	26,643	52,416	-	192,155	269	282,880	53.58
Boston	-	-	-	20,600	15,980	16,081	-	43,780	90,543	84,641	86,582	-	205,218	5,041	1,654,052	447,512	1,039,570	-	1,111,485	81,524	4,992,609	945.57
Brookline	-	-	-	-	-	-	-	-	-	10,007	27,292	-	20,057	13,020	63,342	80,936	97,549	-	267,774	-	579,977	109.84
Chelsea	-	-	-	-	-	-	-	-	-	-	-	-	5,176	-	5,479	40,131	33,090	-	152,564	6,747	243,187	46.06
Everett	-	-	-	-	-	-	-	-	-	2,484	2,900	-	6,948	5,998	8,306	45,843	31,045	-	172,187	29,379	305,090	57.78
Lexington	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16,281	5,801	45,267	-	180,557	27,890	275,796	52.23
Malden	-	-	-	-	-	-	-	-	-	-	-	-	8,891	11,118	93,876	35,994	108,680	-	233,932	48,971	541,462	102.55
Medford	-	-	-	-	-	-	-	-	-	-	673	-	6,775	9,598	40,962	44,529	127,020	-	256,760	24,251	510,568	96.70
Melrose	-	-	-	-	-	-	-	-	-	-	-	-	5,223	3,024	23,097	23,898	26,925	-	193,368	52,861	328,396	62.20
Milton	-	-	-	-	-	-	-	-	-	-	-	-	3,415	72	45,316	23,980	75,211	-	214,405	18,071	380,470	72.06
Nahant	-	-	-	-	-	-	-	-	-	-	-	-	-	10,444	5,550	11,550	6,642	-	37,942	58,652	130,780	24.77
Newton	-	-	-	-	-	-	-	-	-	981	39,581	-	3,070	-	85,700	7,099	177,499	-	642,046	61,400	1,017,376	192.68
Quincy	-	-	-	-	-	-	-	-	-	-	15,450	-	32,123	-	76,765	77,758	224,918	994	447,868	75,919	951,795	180.26
Revere	-	-	-	-	-	-	-	-	-	-	-	-	10,600	7,416	38,104	36,565	58,301	-	143,359	62,116	356,461	67.51
Somerville	-	-	-	-	-	-	-	-	-	-	5,577	367	10,094	7,942	110,847	69,111	113,499	-	217,180	19,399	554,016	104.93
Stonham	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10,725	175	5,110	-	130,003	19,887	165,900	31.42
Swampscott	-	-	-	-	-	-	-	-	-	-	-	-	-	3,721	6,714	21,800	7,375	-	113,686	7,366	160,662	30.43
Watertown	-	-	-	-	-	-	-	-	-	-	-	-	2,991	11,372	7,628	33,971	67,735	-	181,127	7,662	312,486	59.18
Winthrop	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4,049	24,198	64,032	-	57,784	32,032	182,095	34.49
Total feet	86,002	17,569	13,486	238,249	26,849	22,968	7,274	107,796	168,482	194,190	280,424	367	487,198	88,792	2,375,689	1,094,291	2,422,202	994	5,197,867	649,890	13,480,579	-
Total Miles	16.29	3.33	2.55	45.12	5.08	4.35	1.38	20.42	31.91	36.78	53.11	.07	92.27	16.82	449.94	207.25	458.75	.19	984.44	123.09	-	2,553.14

TABLE NO. 22. — *Number of Service Pipes, Meters, Per Cent of Services Metered, Fire Services and Fire Hydrants in the Several Cities and Towns in the Metropolitan Water District, December 31, 1929*

CITY OR TOWN	Services	Meters	Per Cent of Services Metered	Services Used for Fire Purposes Only	Fire Hydrants
Arlington	6,585	6,585	100.00	35	779
Belmont	3,960	3,960	100.00	10	437
Boston	98,890	98,852	99.96	3,066	11,653
Chelsea	5,816	5,811	99.91	136	434
Everett	7,303	7,294	99.88	44	605
Lexington	2,265	2,265	100.00	5	378
Malden	9,526	9,512	99.85	77	702
Medford	10,317	10,317	100.00	30	972
Melrose	5,641	5,641	100.00	24	451
Milton	3,853	3,853	100.00	3	579
Nahant	873	873	100.00	2	123
Quincy	16,334	15,574	95.35	41	1,666
Revere	6,356	6,258	98.46	7	462
Somerville	14,148	13,995	98.92	115	1,371
Stoneham	2,295	2,290	99.78	3	175
Swampscott	2,625	2,625	100.00	7	275
Watertown	5,906	5,906	100.00	37	645
Winthrop	3,712	3,712	100.00	6	369
District Supplied	206,405	205,323	99.48	3,648	22,076
Brookline	7,589	7,589	100.00	30	920
Newton	14,867	14,867	100.00	100	1,435
Total District	228,861	227,779	99.53	3,778	24,431

TABLE No. 23. — Elevation of the Hydraulic Grade Line, in Feet, above Boston City Base for Each Month at Stations on Metropolitan Water Works during 1929

1929 MONTH	LOW SERVICE										SOUTHERN HIGH SERVICE									
	WATERTOWN WATER WORKS OFFICE, MAIN STREET		BELMONT WATER WORKS SHOP, WAVER- LEY STREET		BOSTON, 43 HAWKINS STREET		ALLSTON, ENGINE HOUSE, HARVARD STREET		MEDFORD NEAR MYSTIC RESERVOIR		SOMERVILLE PUBLIC LIBRARY, HIGHLAND AVENUE		MALDEN WATER WORKS SHOP, GREEN STREET		CHELSEA COURT HOUSE		BOSTON METROPOLI- TAN WATER WORKS, OFFICE 1 ASHBURTON PLACE		QUINCY, FORBES HILL TOWER	
	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum
January	196	163	186	175	155	144	184	166	165	155	165	153	164	156	158	139	247	224	238	224
February	197	166	183	175	155	144	189	167	166	154	165	153	165	156	158	139	247	224	240	218
March	197	159	185	171	155	140	189	164	166	154	165	153	165	156	160	139	247	220	241	224
April	196	161	192	175	155	144	184	163	166	151	166	151	165	155	161	142	245	220	240	222
May	196	161	190	174	155	140	186	163	168	157	168	155	164	156	162	139	244	217	240	207
June	194	175	185	163	153	138	189	163	169	158	167	153	164	156	162	142	244	215	240	203
July	197	162	187	163	153	138	191	166	169	157	168	153	164	153	162	140	243	215	238	209
August	197	173	186	167	154	138	189	168	168	157	168	155	165	156	162	142	243	219	240	210
September	189	177	183	162	152	138	191	167	169	157	166	154	163	156	160	140	244	215	240	211
October	194	174	178	167	152	138	189	167	168	157	167	154	163	153	158	140	244	217	240	222
November	194	177	183	164	156	138	189	164	168	157	165	151	163	156	162	142	244	219	240	223
December	194	180	181	163	156	138	189	166	168	157	166	153	163	156	158	139	244	219	240	222
Averages	195	169	185	168	154	140	188	165	168	156	166	153	164	155	160	140	245	219	240	216

TABLE No. 23. — *Elevation of the Hydraulic Grade Line, in Feet, above Boston City Base, etc. — Concluded*

	1929 MONTH	SOUTHERN HIGH SERVICE —Concluded				NORTHERN HIGH SERVICE							
		QUINCY WATER WORKS SHOP		SOMERVILLE WATER WORKS SHOP		MALDEN CITY HALL		REVERE WATER WORKS SHOP, BROADWAY		LYNN ENGINE HOUSE, UNION SQUARE		WINTHROP TOWN HALL, HERMAN STREET	
		Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum
January	.	230	207	263	254	269	260	259	241	255	229	200	178
February	.	235	214	266	254	269	262	262	244	255	231	188	161
March	.	233	209	266	254	269	262	259	244	255	233	185	163
April	.	230	216	263	251	269	258	259	241	254	231	189	162
May	.	227	204	266	248	268	258	265	236	254	224	189	163
June	.	223	200	263	238	265	265	262	223	240	171	189	142
July	.	223	196	263	233	269	258	259	216	238	162	189	129
August	.	223	196	263	245	268	260	260	232	238	169	189	130
September	.	223	204	263	238	268	260	260	228	245	185	191	130
October	.	227	200	266	210	267	262	265	236	261	220	196	163
November	.	228	207	268	221	269	262	267	251	266	241	189	165
December	.	223	214	268	259	269	262	267	255	266	245	194	165
Averages	.	227	206	265	242	268	260	262	237	252	212	191	154

APPENDIX NO. 4

CONTRACTS MADE AND PENDING DURING

Contracts relating to the

1	2	3	AMOUNT OF BID		6
			4	5	
Number of Contract	WORK	Number of Bids	Next to Lowest	Lowest	Contractor
1	29 ²	Section 110, New Mystie Valley Sewer, North Metropolitan System, in Medford.	10	\$221,100 00 \$205,657 00 ¹	J. H. Ferguson Co., Providence, R. I.
2	31 ²	Section 109, New Mystie Valley Sewer, North Metropolitan System, in Medford.	8	157,104 00 141,560 00 ¹	V. James Grande, Brighton, Mass.
3	33	Furnishing and installing new staybolts in three vertical boilers at East Boston Pumping Station.	6	5,580 00 4,050 00 ¹	International Engineering Works, Inc., Framingham, Mass.

Contracts relating to the

1	32	Furnishing labor and material for making borings, New Neponset Valley Sewer, South Metropolitan System, in Milton.	3	\$1.10 per lin. ft.	\$0.95 ¹ per lin. ft.	Edward P. Healey, Roxbury, Mass.
2	34	Section 107, New Neponset Valley Sewer, South Metropolitan System, in Milton.	11	\$117,800 00	\$99,040 00 ¹	V. Barletta Co., Roslindale, Mass.
3	35	Section 108, New Neponset Valley Sewer, South Metropolitan System, in Milton.	17	113,236 50	108,105 00 ¹	Frank W. Christy, Providence, R. I.
4	36	Section 109, New Neponset Valley Sewer, South Metropolitan System, in Milton.	17	199,700 00	195,700 00 ¹	V. Barletta Co., Roslindale, Mass.

¹ Contract based upon this bid.

² Contract completed.

APPENDIX No. 4

THE YEAR 1929. — SEWERAGE DIVISION

North Metropolitan System

7	8	9	10	
Date of Contract	Date of Completion of Work	Prices of Principal Items of Contracts made in 1929	Value of Work done Dec. 31, 1929	
Feb. 23, 1928	June 12, 1929	- - -	\$210,751 66	1
Aug. 24, 1928	Sept. 12, 1929	- - -	154,215 51	2
May 16, 1929	-	For furnishing all labor, tools, materials and appliances necessary for removing old staybolts and furnishing and installing new 1½ inch staybolts in three vertical boilers.	5,400 00 ³	3

South Metropolitan System

Apr. 4, 1929	-	For furnishing labor and material for making earth borings along line of proposed New Neponset Valley Sewer in Milton.	\$7,464 15 ⁴	1
Aug. 1, 1929	-	For excavation and refilling in trench for 72-inch by 75-inch concrete sewer, \$12 per lin. ft.; for Portland cement brick masonry in manholes and special structures, \$40 per cu. yd.; for Portland cement concrete masonry in trench for sewer and special structures, \$10 per cu. yd.; for Portland cement boulder concrete masonry in trench, \$8 per cu. yd.; for rock excavation in trench, \$8 per cu. yd.	51,751 00	2
Sept. 5, 1929	-	For excavation and refilling in trench for 72-inch by 75-inch concrete sewer, \$10 per lin. ft.; for Portland cement brick masonry in manholes and special structures, \$32.50 per cubic yard; for Portland cement concrete masonry in trench for sewer and special structures, \$12 per cu. yd.; for Portland cement boulder concrete masonry in trench, \$5 per cu. yd.; for rock excavation in trench, \$4.50 per cu. yd.	26,201 50	3
Dec. 5, 1929	-	For excavation and refilling in trench for 72-inch by 75-inch concrete sewer, \$23 per lin. ft.; for excavation of rock or earth or both and refilling of tunnel for 72-inch by 75-inch concrete and brick sewer, \$30 per lin. ft.; for Portland cement brick masonry in manholes and special structures in trench, \$35 per cu. yd.; for Portland cement brick masonry in tunnel and tunnel shafts, \$40 per cu. yd.; for Portland cement concrete masonry in trench for sewer and special structures, \$11 per cu. yd.; for Portland cement concrete masonry in tunnel and tunnel shafts, \$15 per cu. yd.; for Portland cement boulder concrete masonry in trench and tunnel, \$8 per cu. yd.; for rock excavation in trench, \$7 per cu. yd.	-	4

³ Contract extended at same rate to cover three additional boilers at East Boston Pumping Station.
⁴ Contract extended at same rate to cover additional borings in Canton, Stoughton, Norwood and Walpole.

CONTRACTS MADE AND PENDING DURING THE YEAR 1929 — SEWERAGE

DIVISION — Concluded

Summary of Contracts

	Value of Work done Dec. 31, 1929
North Metropolitan System, 3 Contracts	\$370,367 17
South Metropolitan System, 4 Contracts	85,416 65
Total of 7 contracts made and pending during the year 1929	\$455,783 82

